QMS® 1660 Print System Reference

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1

Introduction

In This Chapter...

- About this manual
- Typographic conventions

Introduction

This manual provides information you may need only once in a while. Use it in conjunction with your other QMS 1660 Print System documentation.

This chapter gives you a brief overview of this manual.

About This Manual

The information in this manual is divided into the following sections:

1	**Introduction**	Provides an overview of the manual.
2	**Print Media**	Lists print media sizes, margins, and imageable areas and provides media storage information.
3	**Professional Printing**	Discusses typographic terms, displays the printer's typefaces, and provides some page design tips.
4	**Printer Configuration**	Explains the methods of configuring the printer, demonstrates how to use printer control panel, and provides a complete discussion of the configuration menu.
5	**Additional Technical Information**	Discusses printer-host communication, memory terms and configuration, end job mode, IEEE 1284 bidirectional parallel interface modes, PS Protocol, HP-GL color encoding, and PCMCIA card slots.

6 **Printer Options**

Describes how to install and use additional paper cassettes, a paper feeder, and a paper cassette supporter; font, emulation, and security cards; memory upgrades (SIMMs); an Intellifont font SIMM; 1200x1200 dpi resolution daughterboard; LocalTalk and network interfaces; an IDE-SCSI hard disk drive board, an internal IDE hard disk, an internal Kanji font IDE hard disk, and external SCSI hard disks.

A **QMS Customer Support**

Provides world-wide product sales and support telephone numbers and describes how to communicate with QMS through the QMS Bulletin Board, CompuServe, the Internet and Q-FAX.

B **Technical Specifications**

Provides technical specifications for the printer and lists available supplies and replacement parts.

C **Document Option Commands**

Lists printer-supported Document Option Commands (DOCs), provides updated HP PCL 5 terminology, and discusses updated DOCs.

D **Notices**

Lists manual and legal notices.

E **Configuration Menu**

Displays the printer configuration menu in tree form.

Glossary

Defines commonly used terms.

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Typographic Conventions

The following conventions are used throughout this manual:

`Mixed-Case Courier`	Text you type, and messages and information displayed on the screen
`Mixed-Case Italic Courier`	Variable text you type; replace the italicized word(s) with information specific to your printer or computer
`UPPERCASE COURIER`	Information displayed in the printer message window
lowercase bold	PostScript operators and DOS commands
lowercase italic	Variable information in text and PostScript variables
UPPERCASE	File and utility names
↵	Press the Enter key (PC) or Return key (Macintosh)
^	Press and hold down the Ctrl key (PC)

» **Note:** *Notes contain tips, extra information, or important information that deserves emphasis or reiteration.*

▲ **Caution**: *Cautions present information that you need to know to avoid equipment damage, process failure, or extreme annoyance.*

● **WARNING!** *Warnings indicate the possibility of personal injury if a specific procedure is not performed exactly as described in the manual.*

ACHTUNG! *Bitte halten Sie sich exakt an die im Handbuch beschriebene Vorgehensweise, da sonst Verletzungsgefahr bestehen könnte.*

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Print Media

In This Chapter . . .

- Media sizes, margins, and imageable areas
- Media storage

Introduction

This chapter lists the media sizes and imageable areas supported by the QMS 1660 Print System, and then provides information on selecting and storing media.

Media Sizes, Imageable Areas, and Margins

Your printer supports media in a number of sizes.

▲ **Caution**: *The media size must match the cassette size. Since the cassette sends a size signal to the printer controller, using the wrong size media will cause your image to be positioned incorrectly on the page or clipped. You may purchase additional cassettes from your QMS vendor.*

Imageable Area

Each media size has a certain imageable area, the maximum area on which the printer can print. This area is subject to both hardware limits (the physical media size and the margins required by the printer) and software constraints (the amount of memory available for the full-page frame buffer).

The following table lists the size, imageable area, and feed edge (the edge of the media drawn into the printer first) of all supported media:

Media	Media Size		Imageable Area		Feed
	Inches	Millimeters	Inches	Millimeters	Edge
11x17 12x19	11.00x17.00 11.70x19.50	279.40x431.80 297.18x495.30	10.69x16.66 11.37x19.16	271.61x432.17 288.80x486.66	Short Short
A3 A4 A5 A6/Postcard	11.69x16.54 8.27x11.69 5.83x8.27 4.13x5.85	296.93x420.12 210.06x296.93 148.09x210.06 104.90x148.59	11.38x16.20 7.92x11.38 5.48x7.96 3.82x5.50	289.22x411.48 201.38x289.22 139.32x202.18 97.19x139.82	Short Long Long Short
B4 B5 B6	10.12x14.32 7.16x10.12 5.06x7.17	257.05x363.73 181.86x257.05 128.52x182.12	9.81x13.98 6.82x9.81 4.74x6.82	249.26x355.09 173.23x249.26 120.56x173.35	Short Long Short
Executive	7.25x10.50	184.15x266.70	6.94x10.16	176.44x258.06	Short
Full Ledger	11.70x17.40	297.18x441.96	11.37x17.16	288.80x435.86	Short
Legal Letter	8.50x14.00 8.50x11.00	215.90x355.60 215.90x279.40	8.18x13.66 8.16x10.69	207.94x346.96 207.26x271.61	Short Long
Universal	11.70x17.00	297.18x431.80	11.38x16.66	287.02x429.26	Short

Working Within the Imageable Area

The imageable areas for print media on your QMS 1660 Print System are not centered vertically on their respective pages and may vary $1/16$" (1.6 mm). You can align the image in several different ways:

■ Adjust the margins or page size through your application.

■ Use the printer's control panel (Administration/Engine/Image Alignment menu).

■ Use the PS Executive Series Utilities. See the on-line help for instructions.

■ Use the PostScript **translate** and **scale** operators to reduce image size and change its placement on the page.

Page Margins

Margins are set through your application. Some applications allow you to set custom page sizes and margins while others have only standard page sizes and margins from which to choose. If you choose a standard format, you may lose part of your image (due to imageable area constraints). If you can custom-size your page, use exactly those sizes given for the imageable area.

Media Types and Weights

Your printer supports labels, paper, postcards, and transparencies in a number of sizes. Although the printer is not specifically designed for envelope printing, you may want to test print a standard envelope to see if the print quality is suitable for your needs. See "Envelopes: Special Considerations" in chapter 2, "Consumables," of the *Operation* manual for more information on printing envelopes.

Labels

Type

Use only labels recommended for laser printers, such as Avery 5260. Adhesive label stock has pressure-sensitive (peel-and-stick) adhesive backing.

Weight

The printer supports 17-34 lb (64-128 g/m^2) labels in the multipurpose tray.

Paper

Type

Use only paper recommended for laser printers, such as Hammermill Laser Print. Thicker paper, such as Xerox 4024 (28 lb [105 g/m2]), is also acceptable in the multipurpose tray.

» **Note:** *We recommend that you do not print on perforated or 3-hole punched paper.*

Weight

The printer supports the following weights of paper:

- **Multipurpose tray**—17-34 lb (64-128 g/m^2)
- **Paper cassettes**—17-24 lb (64-90 g/m^2)

Postcards

Weight

The printer supports 17-34 lb (64-128 g/m^2) postcards in the multipurpose tray.

Transparencies

Type

Use only transparencies recommended for laser printers, such as Canon brand type D and 3M type PP2500.

Weight

The printer supports 17-34 lb (64-128 g/m^2) transparencies in the multipurpose tray.

Media Storage

Improperly stored media increases the chance of paper jams during printing and can drastically affect the print quality of the printed page. Keep media in good condition by storing it

■ In its wrapper

■ On a flat surface

■ In a closed cabinet

■ In a cool, dry area

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Professional Printing

In This Chapter . . .

- About typefaces and fonts
- Typography terms
- Typeface classification
- Resident typefaces, fonts, and symbol sets

Introduction

This chapter defines common terms used in the description of fonts and typefaces, and displays the printer's resident typefaces.

About Typefaces and Fonts

Many of the terms and phrases used in desktop publishing are derived from the language of professional printers and typesetters. This section explains common words and phrases used when discussing typefaces.

Typeface	Typeface Family
A named design of a set of printed characters, such as Times, that has a specified obliqueness (degree of slant) and stroke weight (thickness of stroke). It does not define a particular size.	A group of similar typefaces. For example, the Times typeface family consists of four typefaces: Times Roman, **Times Bold**, *Times Italic*, and ***Times Bold Italic***.
Font	**Character Set**
A set of characters of the same typeface (such as Times), style (such as *italic*), stroke weight (such as **bold**), and point size (such as 10). Although you hear the term "font" used more generally, as if referring to a typeface, it's really a subset of a typeface.	A collection of symbols designed for various printing applications. Many character sets are composed of the letters (uppercase and lowercase A-Z), digits (0-9), and any symbol (such as blank space, dollar sign, and ampersand). Other character sets are composed entirely of symbols.

Typeface Classification

One way of classifying the different typefaces is to group them into the following categories:

Serif

A serif is a decorative line or tail on the ends of the strokes of a letter. Serifs, usually on the lower half of a letter, have also been referred to as feet or curlicues. Courier, ITC Bookman, New Century Schoolbook, Palatino,

Times Roman

and Times are serif typefaces. In the example shown, all the letters except "e" and "o" have serifs.

Sans Serif

Sans serif ("sans" is French for "without") indicates a typeface without any of these small tails. A

Helvetica

sans serif typeface is decorative by the shape and styling of its letters but has less detail than a serif typeface. Helvetica, Helvetica Condensed, Helvetica Narrow, and ITC Avant Garde Gothic are all sans serif typefaces. In the example shown above, the slight curving at the bottom of the letters "t" and "a" is not a serif. It is part of the line forming the letter rather than a decorative line added on.

Script

Script typefaces simulate handwriting or brush lettering. Each letter is connected visually, if not physically. ITC Zapf Chancery is a script typeface.

Zapf Chancery

Pi or Symbol

Pi or symbol typefaces are collections of assorted special-purpose characters (for example, decorative, graphic, math, or monetary characters). They are especially useful for highlighting items in lists, providing graphics, and displaying symbols that might otherwise have to be drawn in by hand. Many typefaces today include a complement of the more commonly used pi characters. Symbol and ITC Zapf Dingbats are pi typefaces.

Typography Terms

Monospacing

The terms "monospaced" and "fixed-pitch" refer to a typeface whose characters all have uniform and equal spacing. These typefaces are useful for spreadsheets and other documents with columnar data. Monospacing is the opposite of proportional spacing.

Proportional Spacing

The term "proportionally spaced" refers to a typeface in which the width of each character varies. For example, the letter "i" is thinner than the letter "m" and therefore takes up less space. Proportional spacing saves page space and is easier on the eye. This manual's text uses the Helvetica font, a proportionally spaced typeface.

Because proportionally spaced type-faces place each character according to its individual size, they increase legibility and readability. This example shows the difference between a monospaced typeface (Courier) and a typeface (Times).

Bitmapped Font

A bitmapped font is a one in which each character is represented by a set of dot patterns. Each font size requires a different set of dot patterns.

Scalable Font

A scalable font is one in which each character's dot pattern (bitmap) is generated from a mathematical representation (or outline) of the character. Scalable fonts eliminate the need to store many different font sizes.

Point Size

Point size refers to the height of a proportionally spaced typeface. A point is a unit of measure equal to $1/72$". Therefore, the larger the point size, the larger the letter. The following example shows characters in 8, 10, 12, 24, and 36 point sizes:

A B C D E

Pitch

Pitch refers to the number of characters per horizontal inch (cpi) in a monospaced typeface. Therefore, the larger the pitch, the smaller the letter. For example, a ten-pitch typeface prints ten characters per inch (or 10 cpi) while a twelve-pitch typeface prints twelve characters per inch (or 12 cpi). The example shows ten-pitch and twelve-pitch Courier.
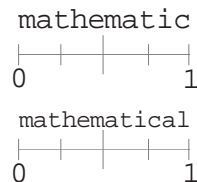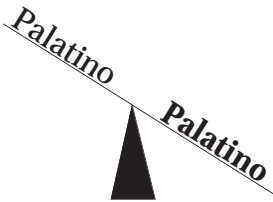
Stroke Weight

Stoke weight (light/medium/bold) is the width (thickness), of the lines (strokes) that make up a character. The example at left shows the medium and bold weights of Palatino.

Italic and Oblique Forms

Italic was originally developed in the early sixteenth century as a typeface based on cursive handwriting. Today's italics are still individually crafted typefaces designed to blend with a specific roman (upright) typeface.

Times Roman
Times Italic

ITC Avant Garde Roman
ITC Avant Garde Oblique

Oblique (or slanted) type forms, however, are not designed and crafted individually but are mechanically slanted versions of the roman form from which they derive.

Orientation

Orientation is the direction of the print or image on a page. Portrait orientation reads from left to right, across the narrower dimension of the page. Landscape orientation also reads from left to right but places the print across the wider dimension of the page. Spreadsheet and table applications commonly use landscape printing. Both terms

derive from painting; a portrait is usually a vertical view while a land-scape is usually a horizontal view.

Resident Fonts, Typefaces, and Symbol Sets

Resident PostScript Fonts

The following 39 PostScript fonts are resident in your printer. See your QMS vendor if you are interested in expanding your printer's typeface families.

All of these typeface families are authentic: they are licensed, they carry the true name, and they have multilingual character sets.

Serif Fonts

ITC Bookman Light
ITC Bookman Light Italic
ITC Bookman Demibold
ITC Bookman Demibold Italic

Palatino Roman
Palatino Italic
Palatino Bold
Palatino Bold Italic

New Century Schoolbook Roman
New Century Schoolbook Italic
New Century Schoolbook Bold
New Century Schoolbook Bold Italic

Times Roman
Times Italic
Times Bold
Times Bold Italic

Courier
Courier Oblique
Courier Bold
Courier Bold Oblique

Sans Serif Fonts

ITC Avant Garde Gothic Book
ITC Avant Garde Gothic Book Oblique
ITC Avant Garde Gothic Demibold
ITC Avant Garde Gothic Demibold Oblique

Helvetica Condensed
Helvetica Condensed Oblique
Helvetica Condensed Bold
Helvetica Condensed Bold Oblique

Helvetica
Helvetica Oblique
Helvetica Bold
Helvetica Bold Oblique

Helvetica Narrow
Helvetica Narrow Oblique
Helvetica Narrow Bold
Helvetica Narrow Bold Oblique

Script Font

ITC Zapf Chancery Medium Italic

Pi or Symbol Fonts

Σψμβολ (Symbol)

✎✇■❧♌☜♦♦ (ITC Zapf Dingbats)

Resident HP PCL Fonts

Your printer has the following resident HP PCL fonts. All fonts can be automatically rotated to landscape orientation. Some are fixed in pitch and point size while others are scalable. Unless otherwise noted, samples are show in 10 point size.

Serif Fonts

```
Courier 12 pitch 10 point
Courier 12 pitch 10 point
Italic
Courier 12 pitch 10 point
Bold
```

```
Courier 10 pitch 12
point
Courier 10 pitch 12
point Italic
Courier 10 pitch 12
point Bold
```

Times (scalable)
Times Italic (scalable)
Times Bold (scalable)
Times Italic Bold (scalable)

Sans Serif Fonts

Line Printer 16.66 pitch
8.5 point

Univers (scalable)
Univers Italic (scalable)
Univers Bold (scalable)
Univers Italic Bold (scalable)

Univers Condensed (scalable)
Univers Condensed Italic (scalable)
Univers Condensed Bold (scalable)
Univers Condensed Italic Bold (scalable)

Pi or Symbol Font

✎✄■♌♌☜♦♦ (ITC Zapf Dingbats)

Resident HP-GL Symbol Sets

Your printer has the following resident HP-GL symbol sets. All come in both fixed- and variable-spaced versions, and all are scalable.

9825 Character Set	ISO Portuguese
ANSI ASCII	ISO Spanish
French/German	ISO Swedish
ISO French	ISO Swedish For Names
ISO German	ISO United Kingdom
ISO IRV (International Reference Version)	JIS ASCII
	Katakana
ISO Italian	Roman Extensions
ISO Norway, Version 1	Scandinavian
ISO Norway, Version 2	Spanish/Latin American
	Special Symbols

Optional Fonts

Your printer supports the following optional fonts:

■ **Downloadable fonts**—Include Type 1 and Type 3 host-resident and printer-card-resident downloadable fonts and Type 42 (Post-Script format) downloadable TrueType fonts. TrueType fonts in HP PCL format are not supported.

■ **Optional Intellifont SIMM**—Increases the number of PCL 5 fonts from 20 to 37. See chapter 6, "Printer Options," for more information.

■ **Optional Kanji internal IDE hard disk**—Provides 6 Kanji fonts. See chapter 6, "Printer Options," for more information.

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Printer Configuration

In This Chapter...

- Methods of printer configuration
- Using the printer control panel
- Using the printer configuration menu

Introduction

This chapter begins by listing and describing the different ways you can configure your printer to meet your special printing needs.

The next section describes how to use the printer control panel to access the configuration menu and how to make configuration changes.

The rest of the chapter provides basic printer configuration information about all configuration menu options. Menu options discussed in this chapter are grouped according to task. After each option is introduced, a table lists the option's location in the configuration menu, the available choices for that option, and the factory default (the value set at the factory).

Methods of Configuration

You have four major ways to configure your printer to meet your printing needs. In order of priority, they are

■   Through an application

■   Through PS Executive Series Utilities

■   Through printer commands

■   Through the printer control panel

■   Through a remote console (for network users)

Using an Application

Using your application is the best way to control your printer since most printing is done on a per-job basis. This helps prevent confusion in network environments and saves you from making changes at the printer control panel. Your application documentation explains how to control your printer settings: probably by choosing options from a printing menu.

Applications use printer drivers to send the appropriate commands automatically to the printer for the requested tasks. If your application doesn't have a QMS 1660 Print System driver, you can select a comparable PostScript driver, such as another QMS driver or a LaserWriter driver. However, comparable drivers may not allow you to access all of your printer's features, such as 1200x600 dpi printing or collating.

Using PS Executive Series Utilities

You can also use the PS Executive Series Utilities (shipped with your printer) to control the printer from your host. See the README file on the utilities disk for information on installing the utilities, and see the utilities on-line documentation for details on using the software.

Using Printer Commands

QMS Document Option Commands (DOC)

Your printer provides a powerful feature that can accommodate your specific print job requirement (and the requirements of any other user on the network) without affecting the printer configuration for other print jobs. This feature is the set of QMS Document Option Commands (DOC).

With DOC, you can add commands to the beginning of your files that, when interpreted by the printer, turn on specific file processing or document handling features. For example, you can use DOC to specify an emulation, select a specific inputbin or media size, choose page orientation, and more. The features you select and the DOC you use take effect only for the curent print job. After your job prints, the DOC added to the beginning of the next file take effect. If no DOC appears on the next file, the printer's default values resume. Appendix C in this manual lists all DOC your printer supports. For more information, refer to the *QMS Crown Document Option Commands* manual, available from your QMS vendor.

Language Commands

PostScript operators and HP PCL and HP-GL commands can enable job-specific features your application or page description language can't access. Refer to your language documentation for specifics.

Using the Control Panel

Your printer is configured at the factory for the most typical printing environments, so most users don't have to use the control panel often. However, if you do need to change a printer setting for all print jobs (not just on a per-job basis), you can do so through the control panel. If you are working in a shared printing environment, your system administrator should be the only person to make changes through the printer's control panel.

The rest of this chapter explains how to use the printer control panel and configuration menu.

Using a Remote Console

Many of the configuration choices that can be made at the control panel can also be made through a remote console if you're connected to a network via an optional network interface. To avoid confusion in a shared printing environment, only the system administrator should make configuration changes.

» **Note:** *If a remote console has the printer off line, pressing the Online/ Offline key will not take effect until the console puts the printer back on line.*

Configuration Menu

The printer's configuration menu allows you change the default printer configuration settings. In other words, changes you make affect all subsequent print jobs.

The options in the configuration menu are organized under three
main menus:

■ **Administration Menu**

Use this menu to maintain printer-host communication informa-
tion, and for selecting and configuring printer emulations, config-
uring special pages, printing engine calibration, and configuring
hard disks (if installed).

■ **Installation Menu**

Use this menu to establish passwords for the Operator Control
and Administration menus. This menu displays only when an
optional security card is installed.

■ **Operator Control Menu**

Use this menu to maintain document processing options (number
of copies, media type, and paper orientation).These capabilities
are usually handled most efficiently within specific print jobs since
each job has its own requirements. However, if there is no way of
specifying these options within a job, you may do so from the
control panel.

Accessing the Configuration Menu

To access the configuration menu, make sure the printer is idle (`IDLE`
displays in the message window), then press the Online/Offline key to
take the printer off line (the Online/Offline indicator is not lighted), and
finally press the Menu key.

Example

The following table shows how to use the control panel keys to
access the printer configuration menu. Press the control panel keys in
the order shown. The printer responds by displaying a status mes-
sage or configuration menu in the message window.

» **Note:** *You may need to press the Next key more than one time to advance through the list of options.*

Press this key...	to...	The message window reads...
Online/ Offline	Turn off the Online/Offline indicator and ready the printer for configuration.	IDLE
Menu	Access the configuration menu.	CONFIGURATION OPERATOR CONTROL

The printer must be off line and idle before you can access the configuration menu.

Selecting Configuration Menu Options

Once you access the configuration menu, you use the control panel keys to move through the menu. Use the following keys:

Press this key...	to...
Next	Advance to the next option or submenu within a menu.
Previous	Return to the previous option or submenu within a menu.
Select	Select an option or enter a submenu.

Example

To change the default printer emulation from ESP to PostScript, press the control panel keys in the order shown in the following table.

» **Note:** *You may need to press the Next key more than once to advance through the list of selections or options.*

Press this key...	to...	The message window reads...
Online/ Offline	Turn off the Online/Offline indicator and ready the printer for configuration.	IDLE
Menu	Access the configuration menu.	CONFIGURATION OPERATOR CONTROL
Next	Advance to the Operator Control/ Administration menu.	CONFIGURATION ADMINISTRATION

Select	Access the Administration menu	ADMINISTRATION COMMUNICATIONS
Select	Access the Communications menu.	COMMUNICATIONS TIMEOUTS
Next	Advance to the Communications/Parallel menu.	COMMUNICATIONS PARALLEL
Select	Access the Parallel menu.	PARALLEL MODE
Next	Advance to the Parallel/Emulation menu.	PARALLEL EMULATION
Select	Access the Emulation menu.	EMULATION ESP
Previous	Advance to the Emulation/PostScript menu.	EMULATION POSTSCRIPT
Select	Select PostScript as the default emulation.	POSTSCRIPT IS SELECTED
	After 3 seconds you are returned to the Parallel/Emulation menu.	PARALLEL EMULATION

Changing Character Information

Sometimes, rather than selecting an option, you need to enter character information. A character is any letter, digit, or symbol. A field is a group of characters that have meaning. Use the printer control panel to enter character information in the message window during printer configuration. The maximum length of the message window is 16 characters.

Entering character information through the control panel is similar to setting the time and date on a digital watch. You enter one character at a time. The current input character flashes. Use the following keys to change the current input character:

Press this key...	to...
Next	Advance to the next choice for the current input character.
Previous	Return to the previous choice for the current input character.

Once you have changed the current input character, use the following keys to move the cursor to another input character:

Press this key...	to...
Select	Advance the cursor to the next character.
Menu	Return the cursor to the previous character.

To exit from the character selection process, move the cursor to the last character of the input field (the character farthest to the right) and press the Select key, or move to the first character of the input field (the character farthest to the left) and press the Menu key.

When you exit, the printer verifies the character information and confirms it in the message window. If the character information is valid, you are returned to the previous menu; if it is invalid, you are returned to the input field. Press the Menu key to cancel any changes to the character information.

If the current character information is longer than the value that you need to enter, replace each extra character with a space. The printer interprets a space at the end of character information as a blank.

Example

To change the HP-GL emulation scaling percent, press the control panel keys in the order shown in the following table. The printer responds by displaying a status message or configuration menu in the message window. An underline indicates the current input character in the message window.

» **Note:** *You may need to press the Next key more than one time to advance through the list of selections or options.*

Press this key...	to...	The message window reads...
Online/ Offline	Turn off the Online/Offline indicator and readies the printer for configuration.	IDLE
Menu	Access the configuration menu.	CONFIGURATION OPERATOR CONTROL
Next	Advance to the Administration menu.	CONFIGURATION ADMINISTRATION

Select	Access the Administration menu	ADMINISTRATION COMMUNICATIONS
Next	Advance to the Communications/ Emulation menu.	COMMUNICATIONS EMULATIONS
Select	Access the Emulations menu.	EMULATIONS ESP DEFAULT EMUL
Next	Advance to the Emulations/HP-GL menu.	EMULATIONS HP-GL
Select	Access the HP-GL menu.	HP-GL PLOTTER
Next	Advance to the HP-GL/Scaling Percent menu.	HP-GL SCALING PERCENT
Select	Access the Scaling Percent menu.	SCALING PERCENT <u>1</u>00
Previous	Lower the current character to 0.	SCALING PERCENT <u>0</u>00
Select	Select 0 and move the current character to the next 0.	SCALING PERCENT 0<u>0</u>0
Next (4 times)	Advance the current character to 5.	SCALING PERCENT 0<u>5</u>0
Select	Select 5 and move the current character to the last 0.	SCALING PERCENT 05<u>0</u>
Select	Select 50 as the default scaling percent.	50 IS SELECTED
	After 3 seconds you are returned to the HP-GL/Scaling Percent menu.	HP-GL SCALING PERCENT

Saving Configuration Changes

Before the printer can accept print jobs with configuration changes, the changes must be saved.

Example

To save your configuration changes, press the control panel keys in the order shown in the following table. The printer responds by displaying a status message in the message window.

Press this key...	to...	The message window reads...
Online/Offline or Menu	Exit from the menu (Online/Offline) or return to the previous menu (Menu). You are prompted to save your change(s).	SAVE CHANGES? NO
Next	Advance to the Save Changes?/Yes option.	SAVE CHANGES? YES
Select	Select Yes. The printer finishes printing any print jobs in process, saves your change, and returns to idle.	IDLE
Online/Offline	Turn on the Online/Offline indicator and ready the printer to accept and print jobs.	IDLE

» **Note:** *The printer may need to be restarted before certain changes to the Administration menu take effect. Some changes restart the printer automatically while others display the message* REBOOT NOW? *in the control panel message window. If this message appears, select* YES *to restart the printer and have the change(s) take effect immediately, or select* NO *to wait until you manually restart the printer for the change(s) to take effect.*

Canceling Configuration Changes

If you change a configuration option and then decide to cancel that change, you can do so when exiting from the configuration menu.

Example

To cancel your configuration changes, press the control panel keys in the order shown in the following table. The printer responds by displaying a status message in the message window.

Press this key...	to...	The message window reads...
Online/ Offline or Menu	Exit from the menu (Online/Offline) or return to the previous menu (Menu) and be prompted to save your change.	SAVE CHANGES? NO
Select	Select No. The printer finishes printing any print jobs in process, does not save your changes, and returns to idle.	IDLE
Online/ Offline	Turn on the Online/Offline indicator and ready the printer to accept print jobs.	IDLE

Setting the Message Window Language

Status messages and configuration menus can be displayed in the message window in English, French, German, or Spanish. If you need to change the message window language, use the Keypad Language option in the Administration/Miscellaneous menu.

Menu	Administration/Miscellaneous/Keypad Language
Choices	English, French, German, Spanish
Default	English
Notes	The printer must be restarted for changes to the Keypad Language menu to take effect. You can either let the printer restart automatically after you save the change and exit from the configuration menu, or you can wait for the change to take effect the next time you manually turn on the printer.

Restoring the Factory Default Configuration

If you need to cancel all of the configuration changes you have made, you can reset all of the configuration settings to their factory defaults.

Menu	Administration/Miscellaneous/Restore Defaults
Choices	Yes, No

Default	No
Notes	This process takes several minutes to complete.

Configuration Menu Options

The rest of this chapter describes the options in the printer configuration menu. Information is organized in the following order:

■ Collation

■ Copies

■ Emulations

■ Hard disks

■ Interfaces

■ Media input

■ Media orientation

■ Media output

■ Media size

■ Memory

■ Optional features

■ Passwords

■ Printer engine

■ Printer start-up options

■ Special pages

■ Timeouts

Collation

Collation is the printing of multiple copies of a document in numeric order. The QMS 1660 Print System is collation capable. It can deliver multiple copies of your files in collated or uncollated order to the output tray.

Menu	Operator Control/Collation
Choices	On—Enable collation.
	Off—Disable collation.
Default	On

If not enough memory is available, chunk collation occurs. Chunk collation breaks a print job into several smaller collation sequences, which must be manually combined to create a single, collated document.

See chapter 3, "Advanced Printing Features," in the *Operation* manual for more information on collation and on improving collation performance on your printer.

Copies

While it is usually preferable to select in your application the number of copies you want to print, you can change the default number of copies for all print jobs through the printer control panel.

Menu	Operator Control/Copies
Choices	001-999
Default	001
Notes	Sets the default number of copies for all subsequent print jobs.

Emulations

Use the Administration/Emulations menu to set the parameters for the available printer emulations. Optional printing emulations appear only if installed.

» **Note:** *To choose an emulation or ESP for a particular interface, use the appropriate interface menu in the Administration/Communications menu. See "Interfaces," later in this chapter, for more information.*

Setting ESP Default Parameters

ESP (Emulation Sensing Processor) technology analyzes incoming file data and selects the appropriate printer emulation from those installed on the printer. The ESP Default Emul option allows you to set the emulation used when ESP is unable to identify the language of a print job. For more information on ESP, see chapter 5, "Additional Technical Information."

Menu	Administration/Emulations/ESP Default Emul
Choices	HPGL, Lineprinter, PCL5, PostScript
Default	PCL5
Notes	You must turn the printer off and back on again for the change to take effect.

Setting HP-GL Parameters

Enhanced Mode

Increases the resolution of a downloaded character.

Menu	Administration/Emulations/HPGL/Enhanced Mode
Choices	On—Standard resolution for fixed- and variable-spaced fonts, 4x8 grid
	Off—Enhanced resolution for variable-spaced fonts, 26x36 grid
Default	Off

Expand Mode

Defines a larger imageable area for the selected media type. This increased imageable area affects the default placement of the scaling points P1 and P2.

Menu	Administration/Emulations/HPGL/Expand Mode
Choices	On—Turn on expand mode.
	Off—Use default scaling points, plotting range, and plotting area.
Default	Off

Origin

Sets the image offset from the plotter's origin in 0.01" increments.

Menu	Administration/Emulations/HPGL/Origin/X Direction
Choices	0000-8500 (0"-8.5")
Default	0000

Menu	Administration/Emulations/HPGL/Origin/Y Direction
Choices	00000-11000 (0"-11.0")
Default	00000

Paper Type

Identifies the original image's paper size.

Menu	Administration/Emulations/HPGL/Paper Type
Choices	A (letter/8.5"x11.0"), A3 (297x420 mm), A4 (210x297 mm), B (11.0"x17.0"), Scale to Paper
Default	Scale to Paper

Pen 1 - Pen 8

Sets the width and color for the eight plotter pens. A width and a color option are available for each pen.

» **Note:** *See chapter 5, "Additional Technical Information," for more information on the HP-GL emulation color encoding equation.*

Menu	Administration/Emulations/HPGL/Pen *x*/Width
Choices	00-60 (0.1-6.0 mm)–see Notes below
Default	Pen 1—7 (0.7 mm)
	Pen 2—3 (0.3 mm)
	Pen 3—3 (0.3 mm)
	Pen 4—3 (0.3 mm)
	Pen 5—3 (0.3 mm)
	Pen 6—3 (0.3 mm)
	Pen 7—3 (0.3 mm)
	Pen 8—3 (0.3 mm)
Notes	A pen width of 00 defaults to 0.1 mm.

Menu	Administration/Emulations/HPGL/Pen *x*/Color
Choices	Black, Blue, Brown, Cyan, Gray - 25%, Gray - 50%, Gray - 75%, Green, Magenta, Orange, Red, Violet, Yellow
Default	Pen 1—Black (100% black)
	Pen 2—Black (100% black)
	Pen 3—Red (70% black)
	Pen 4—Green (41% black)
	Pen 5—Blue (89% black)
	Pen 6—Violet (59% black)
	Pen 7—Orange (25.8% black)
	Pen 8—Brown (50% black)
Notes	Cyan=30% black, magenta=59% black, and yellow=11% black.

Plotter

Identifies the HP-GL plotter type.

Menu	Administration/Emulations/HPGL/Plotter
Choices	7470A, 7475A, 7550A, ColorPro
Default	7550A

Reverse Image

Determines whether an image is printed in reverse.

Menu	Administration/Emulations/HPGL/Reverse Image
Choices	On—Print a white image on a black background.
	Off—Print a black image on a white background.
Default	Off

Scaling Percent

Identifies the percentage to reduce or enlarge an image.

Menu	Administration/Emulations/HPGL/Scaling Percent
Choices	001-150 (1-150%)
Default	100 (100%)

» **Note:** *To scale plots, select the paper size originally used for the plot in the Paper Type menu, and then enter the reduction or enlargement needed to fit the plot on the new page in the Scaling Percent menu. If necessary, enter new x,y coordinates in the Origin menu to reposition the plot on the page.*

Setting HP PCL 5 Parameters

Appendix C, "Document Option Commands," of this manual has updated information on the PCL 5 DOC commands.

Default Font

Sets the default font for this emulation.

Menu	Administration/Emulations/PCL 5/Default Font
Choices	Courier12, Courier12Bold, Courier12Italic, Courier10, Courier10Bold, Courier10Italic, Lineprinter, Select by Index, Times*, Times*Italic, Times*Bold, Times*BoldItalic, Univ*, Univ*Italic, Univ*Bold, Univ*BoldItalic, UnivCond*, UnivCond*Italic, UnivCond*Bold, UnivCond*BldItlc, Zapf Dingbats*
Default	Courier12
Notes	* represents a scalable font (default point size [12 points] is used to scale the font and produce the characters in the selected size).
	If you use Select by Index to select a font by its font index, the printer uses the Administration/Emulations/PCL5/Default Font Idx value to choose the default font.

Default Font Index

Sets the default font index when Select by Index is chosen in the Administration/Emulations/PCL 5/Default Font menu. If a font by the same index number exists, it is selected as the default font. This font must be a cartridge or downloaded soft font.

Menu	Administration/Emulations/PCL 5/Default Font Idx
Choices	00000-32767
Default	Depends on cartridge or downloaded font(s)

Download Location

Controls the default storage location of PCL objects (fonts, macros, and patterns).

Menu	Administration/Emulations/PCL 5/Downld Location

Choices	Disk—All downloaded PCL objects are stored on the default disk, if present. These objects remain on the disk even if the printer power is turned off.
	Memory—All downloaded PCL objects are stored in temporary storage in RAM.
Default	Disk
Notes	DOC commands specifying resources override this option on a per-job basis.
	If this option is set to Disk and no hard disk is installed, memory is used as the default storage location.
	If the printer has both a hard disk and a large amount of memory, setting this option to Memory enhances printer performance.
	Before you download any objects, ensure that the printer has enough memory, or they may not be available for use. If it doesn't, you can install SIMMs (see chapter 6, "Printer Options") to increase printer memory, or you can install a hard disk (see chapter 6, "Printer Options") and enable disk swapping (Administration/Memory/Enable Disk Swap menu– see the "Memory" section, later in this chapter).

Line Termination

Adds an indicator which controls the way the printer interprets CR (carriage return) and LF (line feed) characters.

Menu	Administration/Emulations/PCL 5/Line Termination
Choices	CR=CR, LF=LF
	CR=CR+LF, LF=LF
	CR=CR, LF=CR+LF
	CR or LF=CR+LF
Default	CR=CR, LF=LF

Lines Per Inch

Sets the number of lines printed per inch in increments of .01".

Menu	Administration/Emulations/PCL 5/Lines/Inch x100

Choices	0100-4800
Default	0600

Monochrome HP-GL/2

Allows your printer to emulate a monochrome or color plotter.

Menu	Administration/Emulations/PCL 5/Monochrome GL/2
Choices	Off—Emulate a color plotter (8 pens). Since a monochrome print system has only 2 pen colors (black and white), grayscale patterns are substituted for other colors.
	On—Emulate a monochrome plotter (2 pens).
Default	On
Notes	When set to off, this option maps pen colors as follows:
	Pen 0=White, Pen 1=Black, Pen 2=Red, Pen 3=Green, Pen 4=Yellow, Pen 5=Blue, Pen 6=Magenta, Pen 7=Cyan.
	When set to on, this option tells the printer to map each pen to its assigned color, then convert the color to a grayscale using the National Television System Committee (NTSC) color standard for luminosity coefficients (Additive System):
	$Y = 0.30R + 0.59G + 0.11B$
	Example of how to use the color standard formula:
	$WhiteY = [1*0.30) + (1*0.59) + (1*0.11)]$—100% gray $BlackY = [0*0.30) + (0*0.59) + (0*0.11)]$—0% gray $RedY = [1*0.30) + (0*0.59) + (0*0.11)]$—30% gray $GreenY = [0*0.30) + (1*0.59) + (0*0.11)]$—59% gray $YellowY = [1*0.30) + (1*0.59) + (0*0.11)]$—89% gray $BlueY = [0*0.30) + (0*0.59) + (1*0.11)]$—11% gray $MagentaY = [1*0.30) + (0*0.59) + (1*0.11)]$—41% gray $CyanY = [0*0.30) + (1*0.59) + (1*0.11)]$—70% gray

Point Size x100

Identifies the point size for scalable fonts in 0.25 point increments.

Menu	Administration/Emulations/PCL 5/Point Size x100
Choices	00025-99975 (0.25-999.75 points)
Default	01200 (12 points)

Notes	If the font is not scalable or if a bitmap font is specified, this setting is ignored.

Retain Temporary Fonts and Macros

Allows you to choose whether to retain temporary HP PCL 5 fonts and macros at the end of each print job.

Menu	Administration/Emulations/HP PCL 5/Retain Temporary
Choices	Off—Reset PCL to its default state at the end of each PCL print job, execute an implicit <ESC>E at the start and end of the job, and delete any temporary fonts, macros, and patterns.
	On—Reset PCL to its default state at the end of each PCL print job. Temporary fonts, macros, and patterns from previous PCL print jobs are retained in memory after the print job has completed. You can recall these downloaded fonts, macros, and patterns from within your PCL file without having to download them again.
	On Compatibility—Retain the entire state of PCL as well as the temporary macros, fonts, and patterns from previous PCL jobs unless you do one of the following:
	■ Change any PCL front panel option
	■ Send any PCL-specific DOC command—except the DOC emulation command
	■ Send any other DOC command, such as number of copies, duplex, orientation, or inputbin
	■ Send a PCL job from a different communications port— for examples, if the PCL print environment is set for PCL jobs to print from the parallel port, and a PCL job is sent from the serial port
	If any one of these occurs, the PCL state is reset to the new default, and the previous state is lost.
Default	Off

Scalable Fonts

Specifies whether to enable or disable the printing of HP PCL 5 scalable fonts by an application. This feature may be useful when printing PCL4 documents which may inadvertently select unwanted scalable fonts.

Menu	Administration/Emulations/HP PCL 5/Scalable Fonts
Choices	Enable—Allow selection of scalable fonts. When you print PCL 4 documents, PCL 5 may substitute scalable fonts that could cause your PCL 4 documents to print incorrectly. Disable—Print using bitmap fonts only.
Default	Enable

Symbol Set

Sets the character set used by the HP PCL 5 emulation.

Menu	Administration/Emulations/HP PCL 5/Symbol Set
Choices	Roman-8, PC-850, PC8-US, PC8-DN, ECMA-94, Legal, HPGerman, HPSpanish, ISO-2, ISO-4, ISO-6, ISO-10, ISO-11, ISO-14, ISO-15, ISO-16, ISO-17, ISO-21, ISO-25, ISO-57, ISO-60, ISO-61, ISO-69, ISO-84, ISO-85, Desktop, PS Math, Math 8, Microsoft-Pub, Pi-Font, PS-Text, Ventura-Intl, Ventura-Math, Ventura-US, Windows, PS-Zapf-Dingbats, Ventura-Dingbats, Zapf-Dingbats100, Zapf-Dingbats200, Zapf-Dingbats300
Default	Roman-8

Notes	Not all symbol sets are available with certain resident fonts. The Desktop, PS Math, Math 8, Microsoft-Pub, Pi-Font, PS-Text, Ventura-Intl, Ventura-Math, Ventura-US, and Windows symbol sets cannot be used with the resident bitmap fonts Courier 10, Courier 10 Italic, Courier 10 Bold, Courier 12, Courier 12 Italic, Courier 12 Bold, and LinePrinter.
	The five dingbat symbol sets (PS-ZapfDingbats, Ventura-Dingbats, Zapf-Dingbats100, Zapf-Dingbats200, and Zapf-Dingbats300) can be used with all fonts.
	If a mismatch between a symbol set and font occurs, the standard PCL font selection mechanism is used to locate a font that matches the selected symbol set. With the standard set of fonts distributed for your printer, this matches the Times* font, but other user-installed fonts could change this result.

Setting Lineprinter Parameters

Autowrap

Indicates whether long lines are to be wrapped to the next line instead of being truncated.

Menu	Administration/Emulations/Lineprinter/CRISCRLF
Choices	On—Wrap long lines.
	Off—Truncate long lines.
Default	On

Character Map

Specifies the type of character map to be used.

Menu	Administration/Emulations/Lineprinter/Character Map
Choices	ASCII, EBCDIC
Default	ASCII

Carriage Return is Carriage Return-Line Feed

Stipulates whether each carriage return (CR) in the print job is translated to a carriage return/line feed (CRLF) combination.

Menu	Administration/Emulations/Lineprinter/CR is CRLF
Choices	On—Translate all carriage returns to line feeds.
	Off—Use carriage returns only as carriage returns.
Default	Off

Font

Sets the printer fonts for the current print job. Any PostScript fonts available on the printer can be used. To see a list of available PostScript fonts, print an advanced status page through the printer configuration menu or through the PS Executive Series Utilities.

Menu	Administration/Emulations/Lineprinter/Font
Choices	All printer-resident PostScript fonts.
Default	Courier

Form Feed is Carriage Return-Form Feed

Stipulates whether each form feed (FF) in the print job is translated to a carriage return/form feed (CRFF) combination.

Menu	Administration/Emulations/Lineprinter/FF is CRFF
Choices	On—Translate all form feeds to carriage return/form feed combinations.
	Off—Use form feeds only as form feeds.
Default	On

Line Feed is Carriage Return-Line Feed

Stipulates whether each line feed (LF) in the print job is translated to a carriage return/line feed (CRLF) combination.

Menu	Administration/Emulations/Lineprinter/LF is CRLF
Choices	On—Translate all line feeds to carriage return/line feed combinations. Off—Use lines feeds only as line feeds.
Default	On

Line Numbering

Specifies that a five-digit number is to be prefixed to the beginning of each line.

Menu	Administration/Emulations/Lineprinter/Line Numbering
Choices	On—Number all lines. Off—Don't number lines.
Default	Off

Lines Per Page

Specifies the number of lines printed on a page before an automatic page eject. Interline spacing is set to the selected point size. Logical pages consisting of more lines than specified are split into multiple pages.

Menu	Administration/Emulations/Lineprinter/Lines per Page
Choices	1-128
Default	87

Margins

Defines the left, right, top, and bottom margins in 1/100" increments.

Menu	Administration/Emulations/Lineprinter/Margins	
Choices	Bottom	0-1700 (0"-17.00")
	Left	0-1700 (0"-17.00")
	Right	0-1700 (0"-17.00")
	Top	0-1700 (0"-17.00")
Default	Bottom	0
	Left	0
	Right	0
	Top	0

Orientation

Specifies whether text and graphics are placed on the page in a portrait or landscape orientation.

Menu	Administration/Emulations/Lineprinter/Orientation
Choices	Landscape, Portrait
Default	Portrait

Point Sz 100ths

Sets point size (in .01 point increments) of the font for the current print job.

Menu	Administration/Emulations/Lineprinter/Point Sz 100ths
Choices	00400-25600 (4-256 points)
Default	00880 (8.8 points)

Tab Stops

Specifies the number of spaces between tab stops.

Menu	Administration/Emulations/Lineprinter/Tab Stops
Choices	0-256
Default	8

Setting PostScript Parameters

Emulation Level

This menu allows you to select a PostScript emulation level.

Menu	Administration/Emulations/PostScript/Emulation Level
Choices	Level 2—For PostScript Level 2 files and most Level 1 files.
	Level 1 B/W—For files that contain only black-and-white PostScript Level 1 operators. This mode does not support the PostScript color operators; the use of color operators could cause the print job to fail.
	Level 1 Color—For files that contain color PostScript Level 1 operators. This mode accepts color PostScript Level 1 operators and translates these commands to the appropriate grayscale. This is the recommended setting for Level 1 compatibility since it contains all of the commands in Level 1 B/W and the color commands.
Default	Level 2
Notes	In general, we recommend that you use the Level 2 option. Use the Level 1 B/W and Level 1 Color options only if you have files prepared in an application which is not fully compatible with Adobe's PostScript Level 2 page description language.

Gamma Correction

This option enables or disables gamma correction for PostScript files. For more information, see chapter 5, "Additional Technical Information," in the *Reference*.

Menu	Administration/Emulations/PostScript/Gamma Correction
Choices	No—Disables gamma correction
	Yes—Enables gamma correction, which adjusts the range of gray levels to give you the best possible image. Gamma correction sharpens overall mid-range contrast while blacks (shadows) and white (highlights) keep their original values. You can use this option to correct gray-scale problems or to accenturate detail for scanned images.

Default	No
Notes	Gamma correction is automatically adjusted when printer resolution is changed, and it applies only to PostScript images.
	If turning on gamma correction doesn't yield a suitable gray-scale image for your needs, set a specific gamma correction value through your drawing application or through the PostScript **settransfer** operator. (See your drawing application documentation and the *PostScript Language Reference Manual* for more information.)

Halftone Type

This option allows you to specify the halftone used to print PostScript files. For more information, see chapter 5, "Additional Technical Information," in the *Reference*.

Menu	Administration/Emulations/PostScript/Halftone Type
Choices	Basic—Regular dot placement at 53 lpi for 300x300 resolution or 71 dpi for 600x600 resolution.
	Advanced—Variable dot placement according to the grayscale within the image. Generally, this option provides smoother transitions between grayscales within the image.
Default	Advanced
Notes	When the advanced halftone type is chosen, gamma correction (Administration/Emulations/PostScript/Gamma Correction menu) has no effect on the image.

Hard Disks

Use the Administration/Disk Operations menu to perform disk operation processes that appear only when optional hard disks are installed.

▲ **Caution**: *If you connect to this printer an external hard disk you previously used with an earlier QMS Crown printer, this QMS 1660 Print System software release will automatically reorganize the files on the hard disk when the printer is turned back on again. (The printer release number is listed on both the start-up and the status page.) Once this reorganization is done, the files on the hard disk can no longer be accessed if the hard disk is reattached to an earlier QMS Crown printer.*

This reorganization process takes time. If, when you first turn the printer on after attaching a previously used hard disk, it does not come on line immediately, be patient. Interrupting the reorganization process could cause all files on the hard disk to be lost.

Formatting a Hard Disk

Use the Administration/Disk Operations/Format Disk menu to format a hard disk. See chapter 6, "Printer Options," for instructions.

» **Note:** *If a* FORMAT FAILED *message displays in the message window during the Format Disk operation, the disk cannot be used. Press the Menu key to remove the message and contact your QMS vendor.*

Installing an Optional Font

Use the Administration/Disk Operations/Install Option menu to add optional fonts to the hard disk from a font card. This selection copies data from the card to the hard disk. See chapter 6, "Printer Options," for instructions.

» **Note:** *If an error message displays in the message window during this operation, press the Menu key to remove the message and restart the operation from the beginning.*

▲ **Caution**: *Before you install any optional fonts, ensure that the printer has enough memory, or they may not all be available for use. If it doesn't, you can install SIMMs (see chapter 6, "Printer Options") to increase printer memory, or you can install a hard disk (see chapter 6, "Printer Options") and enable disk swapping (Administration/Memory/ Enable Disk Swap menu–see the "Memory" section, later in this chapter).*

Removing an Optional Font

Use the Administration/Disk Operations/Remove Option menu to remove a previously installed optional font. See chapter 6, "Printer Options," for instructions.

» **Note:** *If an error message displays in the message window during this operation, press the Menu key to remove the message and restart the operation from the beginning.*

Interfaces

You can customize all of the printer's interfaces through the Administration/Communications menu.

Setting LocalTalk Interface Parameters

Use the Administration/Communications/LocalTalk menu to set the LocalTalk interface values used for printer-host communication.

Mode

Enables or disables the communication interface.

Menu	Administration/Communications/LocalTalk/Mode
Choices	Enabled—Establish one-way LocalTalk communication from the host to the printer). Disabled—Turn off the LocalTalk interface, and the printer stops accepting LocalTalk interface print jobs.

Default	Enabled
Notes	The printer must be restarted for changes to the Mode menu to take effect. You can either let the printer restart automatically after you save the change and exit from the configuration menu, or you can wait for the change to take effect the next time you manually turn on the printer.

Connection

Allows you to enable or disable print spooling.

Menu	Administration/Communications/LocalTalk/Connection
Choices	Conventional—Allow one LocalTalk connection and accept only one print job at a time. If two users send print jobs to the printer, the workstation belonging to the first user is unavailable until the first job has been printed, and the workstation belonging to the second user is unavailable until both jobs have been printed.
	Spool—Allow multiple LocalTalk connections and accept (spools) more than one print job at a time. Workstations are available while jobs are printing.
	Both—Allow both single and multiple LocalTalk connections.
Default	Conventional
Notes	The printer must be restarted for changes to the Connection menu to take effect. You can either let the printer restart automatically after you save the change and exit from the configuration menu, or you can wait for the change to take effect the next time you manually turn on the printer.

Default Job Priority

Allows you to specify which jobs are printed first, according to the interface through which they are received, when jobs are received simultaneously. In other words, you can give jobs received via the LocalTalk interface priority over jobs received via the parallel and serial interfaces.

Menu	Administration/Communications/LocalTalk/Def Job Prio
Choices	001-100 (highest-lowest priority)
Default	001 (highest priority)

Minimum Number of Kilobytes for Spooling

Sets the minimum number of kilobytes of system memory allocated to the AppleTalk interface.

Menu	Administration/Communications/AppleTalk/Min K Spool
Choices	00000-99999
Default	00015
Notes	This value must be less than the K Mem for Spool value.
	A 00000 value does not turn off the spooling buffer for the parallel interface. If the value is set to 00000, the printer calculates the Min K Spool automatically at initialization.
	The printer must be restarted for changes to the Min K Spool menu to take effect. You can either let the printer restart automatically after you save the change and exit from the configuration menu, or you can wait for the change to take effect the next time you manually turn on the printer.

PS Protocol

Sets the binary communications protocol (BCP) for communicating over a LocalTalk interface to a PostScript printer. See chapter 5, "Additional Technical Information," for a full discussion of PS Protocol.

Menu	Administration/Communications/LocalTalk/PS Protocol

Choices	Normal—Enable standard, ASCII hex protocol. Data is sent and received in ASCII format. This mode is recommended if you do not print binary data. It was designed for data in the printable ASCII range. Print jobs can alter the PS protocol value through PostScript operators.
	Normal Fixed—Enable standard, ASCII hex protocol. Print jobs cannot alter this value through PostScript operators.
	Binary—Enable binary communications protocol. Print jobs can alter this value through PostScript operators. Data in the printable ASCII range also prints.
	Binary Fixed—Enable binary communications protocol. Print jobs can not alter this value through PostScript operators. Data in the printable ASCII range also prints.
Default	Normal

Setting Parallel Interface Parameters

Use the Administration/Communications/Parallel menu to set the parallel interface values used for printer-host communications.

Data Bits

Sets the number of data bits transmitted per character.

Menu	Administration/Communications/Parallel/Data Bits
Choices	7 Bits, 8 Bits
Default	8 Bits

Default Job Priority

Allows you to specify which jobs are printed first, according to the interface through which they are received, when jobs are received simultaneously. In other words, you can give jobs received via the parallel interface priority over jobs received via the LocalTalk and serial interfaces.

Menu	Administration/Communications/Parallel/Def Job Prio
Choices	001-100 (highest-lowest priority)

Default	001 (highest priority)

Emulation

Sets the parallel interface emulation.

Menu	Administration/Communications/Parallel/Emulation
Choices	ESP, Hexdump, HPGL, Lineprinter, PCL5, PostScript
	Other optional emulations also appear, if installed.
Default	ESP

End Job Mode

Enables (and identifies an end-of-job sequence) or disables data stream sensing for the end-of-document (EOD) command. These sequences allow hosts to enforce print job sequencing without con- siderations for interacting timeouts. See chapter 5, "Additional Techni- cal Information," for details on how to implement this feature on your QMS 1660 Print System.

Menu	Administration/Communications/Parallel/End Job Mode
Choices	None—The printer recognizes only the PostScript ^D command.
	QMS EOD—The printer recognizes only the QMS %%EndOfDocument command.
	HP EOD—The printer recognizes only the HP <ESC>%- 12345X command.
Default	None

Minimum Number of Kilobytes for Spooling

Sets the minimum number of kilobytes of system memory allocated to the parallel interface.

Menu	Administration/Communications/Parallel/Min K Spool
Choices	00000-99999
Default	00015

Notes	This value must be less than K Mem For Spool.
	A 00000 value does not turn off the spooling buffer for the parallel interface. If the value is set to 00000, the printer calculates the Min K Spool automatically at initialization.
	The printer must be restarted for changes to the Min K Spool menu to take effect. You can either let the printer restart automatically after you save the change and exit from the configuration menu, or you can wait for the change to take effect the next time you manually turn on the printer.

Mode

The parallel interface supportsCentronics parallel communication as well as IEEE 1284 bidirectional (two-way) parallel communication, which provides five modes of operation: byte, compatibility, ECP (enhanced compatibility port), EPP (enhanced parallel port), and nibble. See chapter 5, "Additional Technical Information," for a discussion of the different modes.

Menu	Administration/Communications/Parallel/Mode
Choices	Interactive—Establish bidirectional (IEEE 1284) parallel communication between the host and the printer.
	Noninteractive—Establish one-way (Centronics) parallel communication from the host to the printer.
	Disabled—Turn off parallel communication with the host. The printer stops accepting print jobs over the parallel interface.
Default	Noninteractive
Notes	The printer must be restarted for changes to the menu to take effect. You can either let the printer restart automatically after you save the change and exit from the configuration menu, or you can wait for the change to take effect the next time you manually turn on the printer.

PS Protocol

Sets the binary communications protocol (BCP) for communicating over a parallel interface to a PostScript printer. See chapter 5, "Additional Technical Information," for a full discussion of PS Protocol.

Menu	Administration/Communications/Parallel/PS Protocol
Choices	Normal—Enable standard, ASCII hex protocol. Data is sent and received in ASCII format. This mode is recommended if you do not print binary data. It was designed for data in the printable ASCII range. Print jobs can alter the PS protocol value through PostScript operators. Normal Fixed—Enable standard, ASCII hex protocol. Print jobs cannot alter this value through PostScript operators. Binary—Enable binary communications protocol. Print jobs can alter this value through PostScript operators. Data in the printable ASCII range also prints. Binary Fixed—Enable binary communications protocol. Print jobs can not alter this value through PostScript operators. Data in the printable ASCII range also prints.
Default	Normal

Spooling Timeout

Sets the number of seconds the interface waits for data from the host before terminating a spooled print job.

Menu	Administration/Communications/Parallel/Spool Timeout
Choices	00000-99999
Default	00030

Setting Serial Interface Parameters

Use the Administration/Communications/Serial menu to set the serial interface communication values used for printer-host communications. The following options are available.

Baud Rate

Sets the rate data is received (bits per second) from the host over the serial interface.

Menu	Administration/Communications/Serial/Baud Rate
Choices	300, 600, 1200, 2400, 4800, 9600, 19200, 38400
Default	9600
Notes	Set this option to match the baud rate used by the host. Baud rates of 19200 and 38400 require RTS/CTS hardware flow control (Administration/Communications/Serial/Hdwe Flow Ctl menu). These rates do not support XON/XOFF software flow control (Administration/Communications/Serial /Rcv Sw Flow Ctl menu).

When selecting a baud rate of 2400 or below, increase the Administration/Communications/Timeouts/Emul Timeout value as follows:

Baud Rate	Emulation Timeout (seconds)
2400	10*
1200	20
600	40
300	80

*A baud rate of 2400 works with a 5-second emulation timeout value, but there is no margin for delays between characters.

Data Bits

Sets the number of data bits transmitted per character.

Menu	Administration/Communications/Serial/Data Bits
Choices	7 Bits, 8 Bits
Default	8 Bits

Default Job Priority

Allows you to specify which jobs are printed first, according to the interface through which they are received, when jobs are received simultaneously. In other words, you can give jobs received via the

serial interface priority over jobs received via the LocalTalk and paral-
lel interfaces.

Menu	Administration/Communications/Serial/Def Job Prio
Choices	001-100 (highest-lowest priority)
Default	001 (highest priority)

Emulation

Sets the serial interface emulation.

Menu	Administration/Communications/Serial/Emulation
Choices	ESP, Hexdump, HPGL, Lineprinter, PCL5, PostScript
	Other optional emulations also appear, if installed.
Default	ESP

End Job Mode

Enables (and identifies an end-of-job sequence) or disables data
stream sensing for the end-of-document (EOD) command. These
sequences allow hosts to enforce print job sequencing without con-
siderations for interacting timeouts. See chapter 5, "Additional Techni-
cal Information," for details on how to implement this feature on your
QMS 1660 Print System.

Menu	Administration/Communications/Serial/End Job Mode
Choices	None—The printer recognizes only the PostScript ^D command.
	QMS EOD—The printer recognizes only the QMS %%EndOfDocument command.
	HP EOD—The printer recognizes only the HP <ESC>%12345X command.
Default	None

Hardware Flow Control

Controls the flow of data between the printer and the host.

Menu	Administration/Communications/Serial/Hdwe Flow Ctl

Choices	CTS	Off, on
	DSR	Off, on
	DSR POL	Normal, reverse
	DTR	Off, on
	DTR POL	Normal, reverse
	RTS	Off, on
Defaults	CTS	Off
	DSR	Off
	DSR POL	Normal
	DTR	On
	DTR POL	Normal
	RTS	Off
Notes	If the host uses hardware flow control, set this option to match the type used by the host.	
	Baud rates of 19200 and 38400 require that both RTS and CTS hardware flow control ((Administration/Communications/Serial/Hdwe Flow Ctl menu) be selected. These baud rates do not support XON/XOFF software flow control) Rcv Sw Flow Ctl).	
	To download print system software to flash memory via the serial port, RTS and CTS must both be set to On also, and the cable pinouts must be connected as shown in appendix B, "Technical Specifications."	

Ignore Parity Errors

Specifies how the printer should handle parity errors.

Menu	Administration/Communications/Serial/Ignore Par. Err.
Choices	Off—Ignore parity errors. The printer prints its best interpretation of the character(s) affected by the error.
	On—Don't ignore parity errors. The printer replaces the character(s) affected by the error with a question mark.
Default	Off
Notes	Use the Administration/Communications/Serial/Parity menu to set parity.

Minimum Number of Kilobytes for Spooling

Sets the minimum number of kilobytes of system memory allocated to the serial interface.

Menu	Administration/Communications/Serial/Min K Spool
Choices	00000-99999
Default	00015
Notes	This value must be less than K Mem For Spool.
	A 00000 value does not turn off the spooling buffer for the serial interface. If the value is set to 00000, the printer calculates the Min K Spool automatically at initialization.
	The printer must be restarted for changes to the Min K Spool menu to take effect. You can either let the printer restart automatically after you save the change and exit from the configuration menu, or you can wait for the change to take effect the next time you manually turn on the printer.

Mode

Enables or disables the PostScript interactive mode from the host.

Menu	Administration/Communications/Serial/Mode
Choices	Interactive—Establish two-way communication between the host and the printer.
	Noninteractive—Establish one-way communication from the host to the printer.
	Disabled—Turn off serial communication with the host. The printer stops accepting print jobs over the serial interface.
Default	Interactive
Notes	The printer must be restarted for changes to the Mode menu to take effect. You can either let the printer restart automatically after you save the change and exit from the configuration menu, or you can wait for the change to take effect the next time you manually turn on the printer.

Parity

Sets the check bit used to identify data transmission errors.

Menu	Administration/Communications/Serial/Parity
Choices	Even, None, Odd
Default	None
Notes	The printer's parity setting must match that of the host or application.
	Use the Administration/Communications/Serial/Ignore Par. Err. menu to specify how the printer handles parity errors.

PS Protocol

Sets the binary communications protocol (BCP) for communicating over a serial interface to a PostScript printer. See chapter 5, "Additional Technical Information," for a full discussion of PS Protocol.

Menu	Administration/Communications/Serial/PS Protocol
Choices	Normal—Enable standard, ASCII hex protocol. Data is sent and received in ASCII format. This mode is recommended if you do not print binary data. It was designed for data in the printable ASCII range. Print jobs can alter the PS protocol value through PostScript operators.
	Normal Fixed—Enable standard, ASCII hex protocol. Print jobs cannot alter this value through PostScript operators.
	Binary—Enable binary communications protocol. Print jobs can alter this value through PostScript operators. Data in the printable ASCII range also prints.
	Binary Fixed—Enable binary communications protocol. Print jobs cannot alter this value through PostScript operators. Data in the printable ASCII range also prints.
Default	Normal

Receive Software Flow Control

Sets the software communication protocol used by the printer to control communication from the host computer.

Menu	Administration/Communications/Serial/Rcv Sw Flow Ctl

Choices	ETX/ACK, None, Robust XON/XOFF, XON/XOFF
Default	XON/XOFF

Spooling Timeout

Sets the number of seconds the interface waits for data from the host before terminating a spooled print job.

Menu	Administration/Communications/Serial/Spool Timeout
Choices	00000-99999
Default	00030

Stop Bits

Sets the number of stop bits transmitted per character.

Menu	Administration/Communications/Serial/Stop Bits
Choices	1 Bit, 2 Bits
Default	1 Bit

Transmit Software Flow Control

Sets the software communication protocol used by the host computer to control communication with the printer.

Menu	Administration/Communications/Serial/Xmit Sw Flow Ctl
Choices	ETX/ACK, None, XON/XOFF
Default	None

Setting Optional Interface Parameters

Use the Administration/Communications/Network *x*/*Interface* menu to set the printer-host communication values for an optional network interface, such as CrownNet. The documentation that comes with the interface contains complete configuration information.

Media Input

Your QMS 1660 Print System comes standard with two media cassettes. Using the control panel, you can select a default media input source, chaining these input sources, and name them.

Selecting a Media Input Source

An option in the Operator Control menu allows you to select the default tray or cassette (inputbin) from which media is drawn into the printer.

Menu	Operator Control/Inputbin
Choices	Lower—Standard cassette
	Multipurpose—Multipurpose tray
	Optional—Optional cassette (if installed)
Default	Lower
Notes	The current default inputbin is indicated by the appropriate LED on the print control panel.

Chaining Media Input Sources

An option in the Operator Control menu allows you to "chain" inputbins (tray and cassettes) so that when the first inputbin empties, the printer will automatically draw media from another inputbin.

Menu	Operator Control/Chain Inputbins
Choices	Off—Doesn't switch inputbins; uses only the default inputbin.
	On—Switches to the next inputbin with the same size and type of media when the default inputbin is empty.
	On Any—Switches to the next inputbin, regardless of the size and type of media installed, when the default inputbin is empty.
Default	On
Notes	Use the Operator Control/Inputbin menu to set the default inputbin.

Naming Media Input Sources

Options in the Administration/Engine menu allow you to give each inputbin a more descriptive name. These names are displayed in the printer message window, where appropriate. You can also use them with DOC commands. (See the *QMS Crown Document Option Commands* manual (available for purchase from your QMS vendor) for complete information on DOC commands.)

Inputbin 1

Inputbin 1 is the multipurpose tray.

Menu	Administration/Engine/Inputbin 1 Name
Choices	Up to 16 characters
Default	multipurpose

Inputbin 2

Inputbin 2 is the standard paper cassette.

Menu	Administration/Engine/Inputbin 2 Name
Choices	Up to 16 characters
Default	lower

Inputbin 3

Inputbin 3 is the optional paper cassette.

Menu	Administration/Engine/Inputbin 3 Name
Choices	Up to 16 characters
Default	optional

Media Orientation

Media Orientation

While you can usually specify the orientation of a print job in your application, if you consistently use a certain media orientation, you can set this in the Operator Control/Orientation menu.

Menu	Operator Control/Orientation
Choices	Portrait—Vertical Landscape—Horizontal
Default	Portrait

Media Output

Naming the Media Outputbin

Even though there is only one outputbin, you may want to name it. You can use this name with DOC commands. (See the *QMS Crown Document Option Commands* manual, available for purchase from your QMS vendor, for complete information on DOC commands.)

Menu	Administration/Engine/Outputbin 1 Name
Choices	Up to 16 characters
Default	Upper

Media Size

Identifying the Media Size

Use the Operator Control/Multipurpose Sz menu to identify the size media in the multipurpose tray (inputbin 1).

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Menu	Operator Control/Multipurpose Sz		
Choices	11x17	11.00"x17.00"	279.40x431.80 mm
	12x19	11.70x19.50"	297.18x495.30 mm
	A3	11.69"x16.54"	296.93x420.12 mm
	A4	8.27"x11.69"	210.06x296.93 mm
	A5	5.83"x8.27"	148.09x210.06 mm
	B4	10.12"x14.32"	257.05x363.73 mm
	B5	7.16"x10.12"	181.86x257.05 mm
	B6	5.06"x7.17"	128.52x182.12 mm
	Executive	7.25"x10.50"	184.15x266.70 mm
	Full Ledger	17.40"x11.70"	439.42x297.18 mm
	Legal	8.50"x14.00"	215.90x355.60 mm
	Letter	8.50"x11.00"	215.90x279.40 mm
	Postcard	4.13"x5.85"	104.90x148.59 mm
	Universal	11.70"x17.00"	297.18x431.80 mm
Default	Letter		

Identifying a Default Media Size

Use an option in the Administration/Engine menu to identify the size media the print should use if it does not recognize the size specified for a print job or if no size is specified.

Menu	Administration/Engine/Default Paper		
Choices	Letter	8.50"x11.00"	279.4x215.9 mm
	A4	11.69"x8.27"	297.2x420.4 mm
Default	Letter		

Memory

Your printer is shipped with either 12 MB or 24 MB of memory (RAM), but this memory can be upgraded to 64 MB. The Administration/ Memory menu allows experienced users (systems engineers and technical support staff) to custom-configure the RAM among the various memory users (or "clients") to best meet specific printing, computing, and network needs.

This section briefly describes each of the memory clients. See chapter 5, "Additional Technical Information," for more detailed information on the printer's memory and what benefits, if any, may result from adding memory to each client.

To find out how memory is currently allocated, print a status page Administration/Special Pages menu) or check each client individually in the configuration menu. The printer automatically distributes added or freed memory among all of the memory clients, but it can be reallocated to specific memory clients.

» **Note:** *Keep in mind that misallocating memory may hinder printer performance and that the print engine's fastest speed is 16 pages per minute, no matter how you configure the memory. If you try to set a memory client below a minimum required value, the message* `INCORRECT VALUE` *appears in the control panel message window.*

Disk Cache

The K Mem Disk Cache memory client is the number of kilobytes of RAM dedicated to the disk cache. This memory client speeds file system throughput on the hard disks, if one or more are installed, by storing frequently used data in system memory instead of continually storing it to and retrieving it from a hard disk.

Menu	Administration/Memory/K Mem Disk Cache
Choices	00032-08192
Default	00036

Notes	If no hard disk is used, the disk cache should be set to the minimum. The printer then reallocates the released memory to other clients that need additional memory.
	If one or more hard disks are used, they remain unavailable until sufficient memory is available to the disk cache.
	If you change the K Mem Disk Cache value, the printer automatically restarts after you save your changes and exit from the configuration menu.

The amount of memory needed for this memory client depends on the size and number of hard disks, the number of subdirectories on each disk, and the amount of memory dedicated to caching.

» **Note:** *If sufficient memory is available to the disk cache, all disks are accessible. If insufficient memory is available to the disk cache, some disks may be accessible while others may not be.*

The recommended amount of memory for the disk cache client is

■ 120 KB minimum

■ 0.5 KB per MB of disk storage total for all disks

For example, the recommended amount of memory for the disk cache for a single 120 MB hard disk is 180 KB, and for two 120 MB hard disks it is 240 KB. These are recommended values. The printer will still operate with a smaller cache, but decreased performance may result.

Display

The K Mem Display memory client is the number of kilobytes of RAM dedicated to the display lists. The display list holds the intermediate representation of pages to be printed.

Menu	Administration/Memory/K Mem Display
Choices	00128-12288
Default	00208
Notes	If you change the K Mem Display value, the printer automatically restarts after you save your changes and exit from the configuration menu.

Emulation

The K Mem Emulation memory client is the number of kilobytes of RAM to be used by non-PostScript emulations for temporary storage and for loading optional emulations. If you receive an emulation error, you may need to increase the amount of memory for this client.

Menu	Administration/Memory/K Mem Emulation
Choices	00768-08192
Default	00848
Notes	If you change the K Mem Emulation value, the printer automatically restarts after you save your changes and exit from the configuration menu.

Emulation (Temporary)

The K Mem Emul Tmp memory client is the number of kilobytes of RAM to be used by non-PostScript emulations for storing downloaded (soft) fonts, forms, or macros. Data in this client disappears when the printer is turned off. This client is listed as Temporary on the status page. Increasing this client's size increases the number of PCL downloaded fonts which can be accepted.

Menu	Administration/Memory/K Mem Emul Tmp
Choices	00256-08192
Default	00256
Notes	This value must be greater than the sum of the Min K Spool for all installed and enabled interfaces.
	If you change the K Mem Emul Tmp value, the printer automatically restarts after you save your changes and exit from the configuration menu.

Enable Disk Swap

The Enable Disk Swap memory client gives your printer virtual memory capability for all memory clients through the creation of a "swap file" on the printer's hard disk. The default size of the swap file depends on the amount of RAM installed. The more RAM installed,

the larger the default swap file size will be. The printer uses this file as an extension of its memory. As the physical RAM fills, the printer can swap the contents to the hard disk file to allow more space. This file swapping between disk and RAM occurs at various times throughout the printing process and is completely transparent.

» **Note:** *The printer must have a hard disk to take advantage of this feature.*

Menu	Administration/Memory/Enable Disk Swap
Choices	No—Don't enable disk swapping.
	Yes—Enable disk swapping.
Default	No
Notes	If disk swapping is enabled and the system hard disk is removed or not turned on, the printer automatically resets to the factory defaults. It is then necessary to re-enable disk swapping if you want this functionality.
	Before you install printer options, such as fonts and macros, ensure that the printer has enough memory, or they may not all be available for use. If it doesn't, you can install SIMMs (see chapter 6, "Printer Options") to increase printer memory, or you can install a hard disk (see chapter 6, "Printer Options") and enable disk swapping.
	The printer must be restarted for changes to the Enable Disk Swap menu to take effect. You can either let the printer restart automatically after you save the change and exit from the configuration menu, or you can wait for the change to take effect the next time you manually turn on the printer.
	If you enable disk swapping and restart the printer, the disk cache size automatically increases to 256 KB.

Frame Buffer

The Frame Buffer memory client holds rasterized or bitmapped images of page faces which are ready to be sent to the print engine. A frame holds the contents of each single page image.

If you are uncertain about how to configure your printer's memory, use only the Administration/Memory/Frame Buffer menu. Or use this

menu as a starting point before trying manually to configure your printer's memory. It provides a simple method of defining how much memory should go to each of the clients for the most complicated printing conditions in your environment. Menu options allow you to specify the largest media size you plan to use for each resolution. Memory is then automatically allocated to the clients that require it. Any excess memory is allocated to the excess memory client. See chapter 5, "Additional Technical Information," for more information on memory and the frame buffer client.

» **Note:** *The printer does not allow you to choose features that do not work with the amount of memory currently installed.*

Using this option does not change the media size. It just ensures that you have enough memory allocated to the appropriate clients to print on the requested media size.

Menu	Administration/Memory/Frame Buffer/300 dpi
Choices	12x19
Default	12x19

Menu	Administration/Memory/Frame Buffer/600 dpi
Choices	11x17, 12x19, A3, A4, A5, B4, B5, B6, executive, full ledger, legal, letter, postcard, and universal
Default	11x17

Menu	Administration/Memory/Frame Buffer/1200 dpi
Choices	11x17, 12x19, A3, A4, A5, B4, B5, B6, executive, full ledger, legal, letter, postcard, and universal
Default	letter

PostScript Fonts

The K Mem for PS Fonts memory client is the number of kilobytes of RAM dedicated to caching previously scaled bitmap representations of fonts for the PostScript emulation interpreter. This reduces the number of times a PostScript font must be converted from outline

form to bitmap form, thus reducing processing time. K Mem for PS
Fonts is listed on the status page as Font Cache.

Menu	Administration/Memory/K Mem for PS Fonts
Choices	00088-08192
Default	00168
Notes	If you change the K Mem for PS Fonts value, the printer automatically restarts after you save your changes and exit from the configuration menu.

PostScript Heap

The K Mem for PSHeap memory client, listed on the status page as
Heap, is the number of kilobytes of RAM dedicated to the PostScript
emulation interpreter. This memory client holds downloaded Post-
Script emulation fonts, operators, and forms.

Menu	Administration/Memory/K Mem for PSHeap
Choices	01024-08192
Default	01360
Notes	If you change the K Mem for PSHeap value, the printer automatically restarts after you save your changes and exit from the configuration menu.

Printer Memory

The MB Printer Mem memory client, listed as System Use on the sta-
tus page, is the number of megabytes of RAM available to be split
among the various memory clients. The size of this client's memory
limits the number of jobs that may be queued simultaneously. When
this client's memory is exhausted, the printer slows down, and the
hosts are forced to wait.

Menu	Administration/Memory/MB Printer Mem
Choices	00012-00064
Default	Depends on the amount of memory installed.

Notes	This memory client is not user-configurable.
	If disk swapping is enabled (Administration/Memory/Enable Disk Swap menu), the amount of memory displayed is larger than the actual amount of memory installed in the printer.

Spooling

The K Mem for Spool memory client, listed on the status page as Host Input, is the total number of kilobytes of RAM allocated to all spooling buffers. This memory client stores incoming data from the various interfaces until it is processed and printed.

Menu	Administration/Memory/K Mem for Spool
Choices	00112-06144
Default	00200
Notes	This value must be greater than the sum of the Min K Spool for all installed and enabled interfaces.
Notes	If you change the K Mem for Spool value, the printer automatically restarts after you save your changes and exit from the configuration menu.

When the sum of the Min K Spool for all interfaces is less than K Mem for Spool, memory is allocated as follows:

1   Interfaces with Min K Spool (in the Administration/Communications menu) value greater than zero to receive their specified allocation.

2   Half of the remaining memory is equally distributed among any interfaces with a Min K Spool value of zero.

3   The other half of the remaining memory is called float memory. This memory is divided among all ports with a Min K Spool value of zero. If only one port has a Min K Spool value of zero, that port receives all float memory.

Optional Features

Several printer options (for example, an optional emulation, an optional network interface, and internal and external hard disks) affect printer configuration and the configuration menu. When an option is installed, its configuration information merges into the configuration menu. New menu entries may appear, and the choices for existing configuration values may be extended. See the documentation accompanying the option to learn exactly how it affects the configuration menu.

Passwords

Use the Installation menu to password-protect the Operator Control and Administration menus. The Installation menu appears when an optional security card is installed in your printer. See chapter 6, "Printer Options," for more information on using a security card.

Selecting Passwords

Menus	Installation/Admin Password
Choices	Up to 16 alphanumeric characters
Default	Blank (no password)
Notes	Enable the password in the Installation/Use Admin Pwd menu.

Menus	Installation/Operator Passwrd
Choices	Up to 16 alphanumeric characters
Default	Blank (no password)
Notes	Enable the password in the Installation/Use Operator Pwd menu.

Enabling Passwords

Menus	Installation/Use Admin Pwd
Choices	On—Require a password to enter the Administration menu. Off—Don't require a password to enter the Administration menu.
Default	Off
Notes	Select the password in the Installation/Admin Password menu.

Menus	Installation/Use Operator Pwd
Choices	On—Require a password to enter the Operator Control menu. Off—Don't require a password to enter the Operator Control menu.
Default	Off
Notes	Select the password in the Installation/Operator Passwrd menu.

Using Passwords

When a password is required to enter the Operator Control or Administration menu, the message window displays

```
ENTER PASSWORD
```

when you use the Select key to enter the menu. Enter the password or press the Menu key to return to the menu.

If you specify the correct password, access to the selected menu is granted. However, if you enter an invalid password, the message window flashes

```
INVALID PASSWORD
```

for three seconds and then returns you to the configuration menu.

Printer Engine Features

Through the Administration/Engine menu you can set print engine-related parameters.

Adjusting the Image Alignment

Usually, you don't need to change the way images are placed on the printed page. But if you do, the Image Alignment option allows you to adjust both the horizontal and the vertical placement.

To check image alignment, print a standard status page (use the Status Page key on the printer control panel) on letter/A4-size paper. When the printer is placing images properly, the alignment angle bar in the lower-left corner of the status page is 0.5"/12.7 mm from the left and bottom edges of the page. If the angle bar is off, use the Image Alignment option to align the image horizontally and vertically in pixel increments ($^1/_{300}$" or 0.08 mm).

» **Note:** *Engine constraints may limit the accuracy of pixel alignment.*

Horizontal Offset

Menu	Administration/Engine/Image Alignment/Horiz Offset
Choices	000-300 (0.00"/0 mm-1.00"/25.4 mm)
Default	100 (0.33"/.84 mm)
Notes	See the following sections, "Horizontal and Vertical Controls," and "Image Alignment Guidelines."

Vertical Offset

Menu	Administration/Engine/Image Alignment/Vertical Offset
Choices	000-300 (0.00"-1.00")
Default	100 (0.33"/.84 mm)
Notes	See the following sections, "Horizontal and Vertical Controls," and "Image Alignment Guidelines."

Horizontal and Vertical Controls

Horizontal and vertical controls are based on the leading edge of the paper. Although they are consistent, they may seem to be reversed in function, depending on the leading edge of the paper.

■ **Media fed long edge first (for example, letter/A4) with portrait-oriented printing**—horizontal and vertical seem reversed.

■ **Media fed long edge first (for example, letter/A4) with landscape-oriented printing —** horizontal and vertical operate as expected.

■ **Media fed short edge first (for example, 11x17/A3) with portrait-oriented printing**—horizontal and vertical operate as expected.

■ **Media fed short edge first (for example, 11x17/A3) with landscape-oriented printing**—horizontal and vertical seem reversed.

Image Alignment Guidelines

Use the following table to determine which value to adjust and whether to increase or decrease it to get the desired results:

With this feed edge...	and this orienta-tion...	...adjust this control to move the image...			
		up	down	right	left
short edge	portrait	vertical below 100	vertical above 100	horizontal above 100	horizontal below 100
	landscape	horizontal above 100	horizontal below 100	vertical above 100	vertical below 100
long edge	portrait	horizontal above 100	horizontal below 100	vertical above 100	vertical below 100
	landscape	vertical above 100	vertical below 100	horizontal below 100	horizontal above 100

Enabling/Disabling the Warning Buzzer

You can enable or disable the warning buzzer the print engine sounds when it encounters an error (such as paper out).

Menu	Administration/Engine/Buzzer
Choices	On, Off
Default	Off

Setting Gamma Correction

This option sets the print engine's gamma correction. For complete information on gamma correction, see chapter 5, "Print Quality," in the *Operation* manual.

Menu	Administration/Emulations/PostScript/Gamma Correction
Choices	No—Disables gamma correction
	Yes—Enables gamma correction

Default	No
Notes	Gamma correction is automatically adjusted when printer resolution is changed.
	Gamma correction applies only to PostScript images.

Specifying Page Recovery Action

When a media jam or other similar error occurs, the printer has the capability of reprinting the print job from the page on which the jam occurred.

Menu	Administration/Engine/Page Recovery
Choices	On—Reprints a print job from the page on which the jam or error occurred.
	Off—Don't reprint a print job when a jam or error occurs.
Default	Off

Setting Default Resolution

This option sets the print engine's default resolution.

Menu	Administration/Engine/Def Resolution
Choices	300 dpi—300x300 dpi resolution.
	600 dpi—600x600 dpi resolution.
	1200 dpi—1200x600 dpi resolution.
Default	600 dpi
Notes	If you purchased a printer with 24 MB RAM, all resolutions are available with all media sizes. However, if you purchased a printer with 12 MB RAM, 600x600 dpi and 1200x600 dpi are available only with certain media sizes. Using these resolutions with other media sizes requires additional memory. See appendix B, "Technical Specifications," for details.

Setting Toner Options

Two toner cartridge configuration options are available: Conserve Toner and Toner Out Act[ion].

Conserve Toner

To help you conserve toner, your printer can simulate draft-quality printing. The amount of toner used during printing is reduced by screening the black dots in a 1:4.5 ratio. In other words, 1 black dot is printed for every 4.5 black dots that would in normal printing mode.

» **Note:** *The Conserve Toner option is designed for draft printing only. Turn off the Conserve Toner option when printing proof or final copies of documents to avoid any possible distortion of patterns, halftone, and images. Unlike the control panel, PS Executive allows you to set Conserve Toner on a per-job basis.*

Menu	Administration/Engine/Conserve Toner
Choices	On—Conserve toner; print draft-quality documents.
	Off—Don't conserve toner; print normal, laser-quality documents.
Default	Off

Toner Out Action

You can configure the printer to stop when a TONER OUT error message is displayed in the message window or to continue printing.

Menu	Administration/Engine/Toner Out Act.
Choices	Continue—Continue printing when a TONER OUT message displays.
	Stop—Stop printing when a TONER OUT message displays.
Default	Continue

Setting Energy Conservation

Your printer is compliant with US Environmental Protection Agency (EPA) Energy Star regulations. The EPA Energy Star Computers program promotes the use of energy-efficient personal computers, monitors, and printers and the reduction of air pollution caused by power generation.

» **Note:** *The addition of some optional interfaces, in some combinations, may cause the product to become non-compliant.*

The Energy Saver option specifies whether the printer changes to a low-power state (the engine remains on, but the fuser turns off) after a specified period of inactivity. When a print job is received, the printer begins processing it in the background and returns to normal power within 90 seconds.

Menu	Administration/Engine/Energy Saver
Choices	15 Min—Use lower power after 15 minutes of inactivity.
	30 Min—Use lower power after 30 minutes of inactivity.
	1 Hour—Use lower power after 1 hour of inactivity.
	2 Hours—Use lower power after 2 hours of inactivity.
	3 Hours—Use lower power after 3 hours of inactivity.
	Off—Use normal power all of the time.
Default	1 Hour

Printer Start-Up Options

The Administration/Startup Options menu allows you to configure your printer to run certain options automatically when you turn it on.

Enabling/Disabling the Start-Up Page

By default, the printer prints a start-up page when you turn it on. The start-up page lists basic information about the printer, such as its name, the PostScript emulation level and version, and various printer settings. However, you can turn the start-up page off to conserve paper and toner.

Menu	Administration/Startup Options/Do Start Page
Choices	Yes—Print a start-up page each time the printer is turned on.
	No—Don't print a start-up page each time the printer is turned on.
Default	Yes

Notes	If you used the Administration/Engine/Inputbin *x* Name options to change the names of the inputbins, these names replace Multipurpose, Lower, and Optional in the message window.

Enabling/Disabling the SYS\START File

If you have a hard disk and Do Sys Start is enabled, when the printer is turned on, the controller checks the hard disk for a PostScript file named SYS\START and executes this file. This file does not print.

Menu	Administration/Startup Options/Do Sys Start
Choices	Yes—Check the hard disk for and execute the SYS\START file when the printer is turned on. No—Don't check the hard disk for a SYS\START file.
Default	Yes

Loading the PostScript Error Handler

You have the option of loading Error Handler, a diagnostic tool that allows you to identify PostScript errors encountered during a print job. Refer to the *PostScript Language Reference Manual* (Adobe Systems Incorporated, Reading, PA: Addison-Wesley, 1990, ISBN 0-201-18127-4) for more information on PostScript errors.

Menu	Administration/Startup Options/Do Error Handler
Choices	Yes—Load the Error Handler. No—Don't load the Error Handler.
Default	You must turn the printer off and on again for this option to take effect.

Special Pages

Use the Administration/Special Pages menu to print special pages, such as status pages, calibration pages, header pages, and trailer pages.

Working with Status Pages

Printing a status page is a two-step procedure: Identify the type of status page you want to print, and then print it.

Identifying a Status Page Type

Two types of status pages are available:

■ **Standard**—This one-page document lists printer identification information, current memory configuration, timeouts, communication settings, input buffer sizes, and available fonts.

■ **Advanced**—This document, which can be five or more pages long, contains the same information as the standard status page as well as configuration menu settings, fonts, and downloaded emulations.

Menu	Administration/Special Pages/Status Page Type
Choices	Standard—Choose the single-page status page.
	Advanced—Choose the multipage status page.
Default	Standard

Printing a Status Page

After you have identified the type of status page to print, use the Status Page key on the printer control panel to print it.

Working with Calibration Pages

A calibration page helps you test and maintain optimal print quality. The calibration image contains a gray-scale chart that lets you check print density and gamma correction to get the best possible gray scaling from your printer.

In addition, the calibration page can serve as a quick reference to help you determine whether you need lower or higher resolution for a print job. Print a calibration page at each resolution. By comparing the

pages, you can easily see the difference in the screens, the type quality, and the precision of curves and diagonal lines.

Menu	Administration/Special Pages/Calibration Page
Choices	Yes—Print a calibration page.
	No—Don't print a calibration page.
Default	Yes
Note	The calibration page prints when you exit from the menu.

Working with Header Pages

A header page is a separator page that prints before a print job to help users sort out their jobs. The information on the header page can be customized. See the *QMS Crown Document Option Commands* manual (available for purchase from your QMS vendor) for more information.

Enabling/Disabling Header Pages

Menu	Administration/Special Pages/Header Page
Choices	On—Print a header page before each job.
	Off—Don't print a header page before each job.
Default	Off

Identifying a Header Page Input Source

You can select the inputbin (tray or cassette) from which the printer pulls media when printing the header page.

Menu	Administration/Special Pages/Header Inputbin
Choices	Multipurpose—Pull header page media from the multipurpose tray.
	Lower—Pull header page media from the 250-sheet paper cassette.
	Optional—Pull header page media from the optional paper cassette.
Default	Multipurpose

Notes	If you used the Administration/Engine/Inputbin *x* Name options to change the names of the inputbins, these names replace Multipurpose, Lower, and Optional in the message window.

Working with Trailer Pages

A trailer page is a separator page that prints after a print job to help users sort out their jobs and, if requested, identify print job errors. The information on the trailer page can be customized. See the *QMS Crown Document Option Commands* manual (available for purchase from your QMS vendor) for more information.

Enabling/Disabling Trailer Pages

Menu	Administration/Special Pages/Trailer Page
Choices	Off—Don't print a trailer/error page for each print job.
	On—Print a trailer/error page for each print job.
	On Error—If any print job errors exist, print a trailer page that lists the errors as well as other trailer page information.
	Errors Only—If any print job errors exist, print a trailer page that lists the errors but omits other trailer page information.
Default	Off

Identifying a Trailer Page Input Source

You can select the inputbin (tray or cassette) from which the printer pulls media when printing the trailer page.

Menu	Administration/Special Pages/Trailer Inputbin
Choices	Multipurpose—Pull trailer page media from the multipurpose tray.
	Lower—Pull trailer page media from the 250-sheet paper cassette.
	Optional—Pull trailer page media from the optional paper cassette.
Default	Multipurpose

Notes	If you used the Administration/Engine/Inputbin *x* Name options to change the names of the inputbins, these names replace Multipurpose, Lower, and Optional in the message window.

Timeouts

You can configure a number of printer timeout settings to set a limit to the amount of time the printer waits to perform a certain task.

Setting an Emulation Timeout

The emulation timeout is the maximum number of seconds emulations other than PostScript (such as HP-GL, HP PCL 5, and Line-printer) wait for incoming data.

Menu	Administration/Communications/Timeouts/Emul Timeout
Choices	00000-99999
Default	00005 (5 sec.)
Notes	A value of 000 is the same as infinity (no timeout).
	When selecting a baud rate of 2400 or below (Administration/Communications/Serial/Baud Rate menu), increase the emulation timeout value as follows:

Baud Rate	Emulation Timeout (seconds)
2400	10*
1200	20
600	40
300	80

*A baud rate of 2400 works with a 5-second emulation timeout value, but there is no margin for delays between characters.

Setting an ESP Timeout

The ESP (Emulation Sensing Processor) timeout is the maximum number of seconds the printer uses to match an emulation before

printing the job in the ESP default emulation (Administration/Emula-tions/ESP Default Emul menu).

Menu	Administration/Communications/Timeouts/ESP Timeout
Choices	00000-99999
Default	00003 (3 sec.)
Notes	A value of 000 is the same as infinity (no timeout).

Setting a Manual Feed Timeout

The manual feed timeout is the maximum number of seconds the printer waits for the next sheet of media to be placed in the manual feed tray. If the timeout occurs, the manual feed job is canceled. The multipurpose tray, when accessed by a PostScript emulation operator as bin 0, is the manual feed tray.

Menu	Administration/Engine/Man Feed Timeout
Choices	000-300 (0-5 min.)
Default	060 (1 min.)
Notes	A value of 000 is the same as infinity (no timeout).

Setting a PostScript Emulation Timeout

The PostScript emulation timeout is the maximum number of seconds the PostScript emulation waits for incoming data.

Menu	Administration/Communications/Timeouts/PS Wait Timeout
Choices	00000-99999
Default	00030 (30 sec.)
	However, when a print job is sent from a Macintosh, the PS Wait timeout is automatically changed to 00300 (5 min.).

Notes	A value of 000 is the same as infinity (no timeout.)
	The job is closed and the next job in the queue begins if all of the following occur:
	■ No additional data is received during the specified period of time.
	■ The interface didn't time out.
	■ An EOD (end-of-document commands) was not seen.
	Large print jobs, such as those generated by graphics or computer-aided design applications, require that this number be increased to 00300 (5 min.).

Setting a Print Job Timeout

The print job timeout is the maximum number of seconds the printer processes a print job before it ends the job.

Menu	Administration/Communications/Timeouts/Job Timeout
Choices	00000-99999
Default	00000 (infinity, no timeout)
Notes	A value of 000 is the same as infinity (no timeout).

❖

5

Additional Technical Information

In This Chapter . . .

- Printer-host communication

- Gamma correction

- Memory

- End job mode

- IEEE 1284 bidirectional parallel interface modes

- PS Protocol option

- HP-GL color encoding

Introduction

This chapter provides additional technical information on memory management, end job mode, the PS Protocol option, and HP-GL color-to-grayscale conversion.

Printer-Host Communication

Interface

An interface is the point at which two elements connect so they can work together. A printer-host interface is the way a printer connects to and works with a host (a microcomputer, workstation, minicomputer, mainframe computer, or network), and it involves both hardware and software. The way your printer interfaces with a host depends on many things, including computer type, computer ports available, interface cabling, application software, printer emulations, and printer drivers.

Simultaneous Interface Operation (SIO)

Simultaneous Interface Operation (SIO), a standard feature of QMS Crown architecture, enables your QMS 1660 Print System to communicate simultaneously with hosts through the parallel, serial, Ethernet, and optional interface ports. In other words, SIO allows you to have more than one host communicating with the printer at one time.

ESP Technology

Emulation Sensing Processor (ESP) technology is another standard feature of QMS Crown architecture. ESP technology, which works with most popular commercially available applications, uses a form of artificial intelligence to analyze incoming file data and select the appropriate printer emulation (for example, PostScript emulation,

HP-GL emulation, HP-PCL emulation, or another optional emulation) from those installed on the printer.

The print job is processed without your having to change printer switch settings or send software commands to accommodate different printer emulations.

When your printer is in ESP mode, you can easily print files prepared for a PostScript printer, an HP LaserJet, or an HP-GL plotter. The file prints correctly as long as it begins with the traditional PostScript or HP-GL commands for such items as page formats and job parameters (number of copies, page margins, fonts).

The QMS 1660 Print System prints almost any file sent in a language ESP technology understands, whether you have one, two, or more hosts, and whether you are communicating through a parallel, serial, Ethernet, or optional interface. Most users never have to change from ESP mode to another mode.

Communication Modes

You can either allow your printer to operate in its default ESP mode or configure its ports to accept jobs in only a particular emulation mode (for example, PostScript emulation only, HP PCL only, or HP-GL emulation only). The default printer communication settings can be changed through the Configuration menu, which you access through the control panel—in the Administration/Communications menu, you can choose a default emulation for the parallel and serial interfaces, and in the Administration/Emulations menu, you can configure the printer defaults for each emulation mode. (The optional LocalTalk interface uses only PostScript.)

Advanced users can also use PostScript operators to reconfigure printer ports. Generally, it is best to keep your printer in ESP mode. Since ESP mode is the factory default, all you have to do to use it initially is connect your host and printer and then send a file.

If you do want to reconfigure the interface ports for specific emulations (or if you need to return the printer to ESP mode), use the printer's control panel (the Administration/Communications menu).

Configuring the printer through the control panel is described in chapter 4, "Printer Configuration," of this manual.

Gamma Correction, Halftones, and Screens

Gamma correction is the compression or expansion of the ranges of dark or light shades in a printed image to provide the best copy of scanned images.

Terms

Several terms related to gamma correction are explained in this section to help you better understand the gamma correction concept.

Gray Levels

Gray levels are a progressive series of gray tones between black and white. Gray levels are obtained by varying the ratio of black to white dots. The number of gray levels depends on printer resolution and screen frequency.

» **Note:** *The number of gray levels at 600x600 dpi and 1200x600 dpi is the same. The enhanced print quality is due to elongated halftone cells rather than to an increased number of gray levels.*

Halftone

A halftone is a printed copy of a scanned image as a set of tiny, evenly spaced spots of variable diameter that, when printed, visually blur together to appear as shades of gray. Your QMS 1660 Print System creates halftone cells by mapping each gray level onto a collection of dots.

The following factors influence the quality of a halftone:

■ Printer resolution

■ Screen frequency of the halftone

■ Quality of the scan

■ Diameter of the laser beam

Changing print resolution from 300x300 dpi to either 600x600 or 1200x600 dpi smooths the resulting spots. In addition, because each spot is represented by a wider range of dots, a greater the number of gray levels is possible. The laser beam is part of the print engine, so it's not a factor you can adjust.

» **Note:** *The number of gray levels at 600x600 dpi and 1200x600 dpi is the same. The enhanced print quality is due to elongated halftone cells rather than to an increased number of gray levels.*

Halftone Types

Your printer provides two different types of halftones—basic and advanced. These two options allow you to customize the smoothness of the printed image according to the number of grayscales it uses.

■ **Basic**—Regular dot placement at 53 lpi for 300x300 resolution or 71 dpi for 600x600 resolution.

■ **Advanced**—Variable dot placement according to the grayscale within the image. Generally, this option provides smoother transitions between grayscales within the image.

» **Note:** *When the advanced halftone type is chosen, gamma correction has no effect on the image.*

Screen Frequency

Screen frequency is the number of lines of dots that compose each inch of a halftone screen. The screen frequency of a halftone determines the number of spots used to represent gray levels in a given area. A 71 lines per inch (lpi) screen frequency has 71 lines of dots for each inch of the halftone screen.

The following illustration shows the relationship between screen frequency, gray levels, and print resolution. As the screen frequency increases, the number of gray levels decreases.

Gray Levels

■ 300x300 dpi
□ 600x600 dpi

Screen Frequency (lpi)	300x300 dpi	600x600 dpi
42	51	201
53	33	129
71	19	73
106	9	33
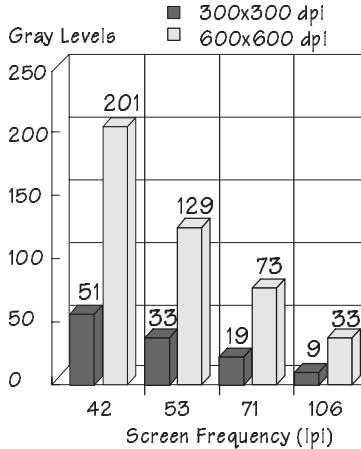
The number of gray levels that your printer can produce depends on the screen frequency and the print resolution. The default value for screen frequency using 600 dpi is 71 lpi. This typically allows 73 different levels of gray. The default value for screen frequency using 300 dpi is 53 lpi. This typically allows 33 different levels of gray. You can change screen frequency through your application or by using the PostScript **setscreen** operator.

The extra gray levels available through higher resolution provide a smoother shift from the darkest black to very light grays while higher resolution provides sharper image outlines.

Screen Angle

A screen angle is the angle at which a halftone screen prints. The default screen angle for your QMS 1660 Print System is 45° at 300x300 and 600x600 dpi. This is the normal angle for black and white printers. At 1200x600 dpi the screen angle is 26.56°.

You can change the screen angle through the PostScript **setscreen** operator.

Gamma Correction Concept

Often in scanned images, gray scaling may be too light or dark to show details clearly. Using gamma correction on a gray-scale image is similar to using a graphic equalizer on a home stereo; the range of gray levels is adjusted for the best possible image. This sharpens overall midrange contrast while blacks (shadows) and whites (high-lights) keep their original values. Gamma correction sets grayscale values specified through the PostScript **setgray** operator to your printer's gray-scale values.

Gamma correction is linked to print resolution. The main benefit of gamma correction is that it improves the print quality of a scanned image by improving halftoning at a given resolution. To get the best gray-scale PostScript image at any resolution, gamma correction should be turned on.

You can set gamma correction through PS Executive or through the Administration/Emulations/PostScript/Gamma Correction menu

Menu	Administration/Emulations/PostScript/Gamma Correction
Choices	No—Don't use gamma correction Yes—Use gamma correction
Default	No
Notes	Gamma correction is automatically adjusted when printer resolution is changed. Gamma correction applies only to PostScript images. If turning on gamma correction doesn't yield a suitable gray-scale image for your needs, set a specific gamma correction value through your drawing application or through the PostScript **settransfer** operator. (See your drawing application documentation and the *PostScript Language Reference Manual* for more information.)

A Special Note for QuarkXPress Users

Make sure you have installed the QMS 1660 and 1660E PDFs in the PDF folder in the QuarkXPress folder. While QuarkXPress 3.3 allows you to access either a PDF or a PPD, to have access to all of your printer's features, you should use the PDF. To select the PDF, go to the Page Setup dialog box in QuarkXPress, and hold down the Shift key while clicking the Printer Type list box. (The italicized selections are PPDs, and the non-italicized selections are PDFs.)

» **Note:** *The 1660E PDF allows you to choose between basic and enhanced (advanced) screening (or halftoning) in QuarkXPress. If this PDF is not present, you won't be able to used enhanced halftoning even though the printer supports it.*

Enhanced Screening

To use enhanced (advanced) screening (or halftoning), do the following:

At the Printer

■ In the Administration/Emulations/PostScript/Halftone Type menu select Advanced.

■ In the Administration/Emulations/PostScript/Gamma Correction menu select No.

In Your QuarkXPress Document (Page Setup Dialog Box)

■ In the Printer Type listbox select 1660 Enhanced Screening PDF.

■ If you have EFIcolor software loaded, select None.

■ Set the Halftone Screen (lpi) to 95.

■ Select Use PDF Screen Values.

■ Ensure that the Halftoning box reads

C   45 lpi 0
M   45 lpi 0
Y   45 lpi 0
K   45 lpi 0

Basic Screening

To use basic screening (or halftoning), do the following:

At the Printer

■ In the Administration/Emulations/PostScript/Halftone Type menu select Basic.

■ In the Administration/Emulations/PostScript/Gamma Correction menu select Yes.

In Your QuarkXPress Document (Page Setup Dialog Box)

■ In the Printer Type listbox select 1660 Basic Screening PDF.

■ If you have EFIcolor software loaded, select None.

■ Set the Halftone Screen (lpi) to the lpi of your choice.

■ Deselect Use PDF Screen Values.

Memory

Memory allows your printer to store and retrieve information that's required to perform many of its tasks. The memory requirements of each printer are dictated by the applications to be run. Each printer comes standard with a certain amount of memory, but you may add more memory as necessary.

The memory is divided among users (or "clients"), each of which allocated a specific amount (or "block") of memory. Each memory client is dedicated to a specific printing and application purpose. Your QMS 1660 Print System allows you to distribute its memory among the various memory clients where it can best serve your specific printing needs. The following sections provide information on memory management so you can get the most from your printer.

Generally, there are two main reasons for wanting to reconfigure your printer's memory:

■ To achieve maximum performance

■ To enable additional features

The ability to configure your printer's memory doesn't necessarily mean that you must change your current configuration. If you're presently using all the features you need and the printer is performing efficiently, you shouldn't feel compelled to reconfigure your printer's memory. Just remember that if your printing needs change, not only do you have the ability to increase the amount of printer memory, but you also can redistribute it where you feel it would best meet your printing requirements.

QMS Memory Management

Managing the memory on your printer is much the same as managing your personal income. In money management, you have a certain amount of income and many ways of spending that income. You decide where that money goes according to what's important to you. There's no single correct way to manage money, but there is one best way for you according to your financial obligations. Just as long as your method works for you.

The same is true for managing the memory on your printer. There's no single correct way for everyone to allocate available printer memory. There is, however, a best way to configure your printer's memory for maximum efficiency in your specific printing environment. For example, if you use a large number of PostScript fonts of various point sizes, you may want to increase the amount of memory allocated to the area specified for PostScript fonts. Or you may want to increase memory to the area that minimizes slowdowns when collating large print jobs.

Memory configuration affects these things as well as the number of jobs that can be accepted by the printer, the number of options available simultaneously, the number of downloadable fonts and emulations that can be stored, and overall printer performance.

Memory Terms

Before you can configure your printer's memory efficiently, you must first understand the different types of memory and how they work

together. Your QMS 1660 Print System documentation uses the following memory terms:

Memory

Memory allows your printer to store and retrieve information. It's the space within your printer where information is stored while being actively worked on.

Memory Client

A memory client is a user of a block of memory dedicated to a specific function. Each memory client controls certain features. When insufficient memory is allocated to a specific client, the features it controls may not be accessible.

Excess Memory

Some printers designate one or two memory clients to receive all the excess, or undesignated, memory. On your QMS 1660 Print System excess memory is distributed among all the memory clients.

Storage

Storage is a device in (or on) which information can be kept. There are three main types of storage—ROM, RAM, and hard disk drives. ROM stores read-only data, RAM represents temporary storage, and hard disk drives hold information on a more permanent basis (see the following definitions).

ROM (Read Only Memory)

This type of memory contains data and/or machine-executable instructions that can be read but not modified. This information is not lost when the printer's power is turned off.

RAM (Random Access Memory)

RAM is the memory your printer uses to perform each task. It can be written to and read from. Once a task is complete, the memory is free again to be used for another file. This memory is volatile, so if your printer loses power while a file is being sent, you must resend the file.

The number and type of features you can run on your printer simulta-
neously depend on the amount of RAM you have and how that RAM
is distributed. Your printer comes with either 12 MB or 24 MB of RAM,
but it is upgradable to 64 MB by adding Single In-line Memory Mod-
ules (SIMMs).

RAM Disk

Also called a virtual disk, the RAM disk is an area of RAM that is used
to simulate an additional hard disk. Data can be written and read
more quickly than on a hard disk, but a RAM disk loses any
information stored on it when the printer's power is turned off. The
spooling buffer is a RAM disk client if a hard disk is not available.

SCSI (Small Computer System Interface)

The printer's SCSI port (located on an optional IDE-SCSI board)
allows you to connect up to three optional SCSI hard disks, providing
storage for fonts, emulations, and other files. Hard disks are also
used to increase the amount of collation that can be accepted and
provide a secondary storage area for spooled data, while providing
virtual memory capabilities.

IDE (Integrated Drive Electronics)

The optional IDE-SCSI board also allows you to connect an internal
IDE hard disk. "Integrated" refers to the fact that all of the controller
electronics are on the drive itself, so no separate adapter card or
expansion slot is required.

Volatile Memory

This type of memory is cleared when the printer is turned off. For
example, most RAM is volatile.

Non-volatile Memory

This type of memory is not lost when the printer loses power.

NV RAM

This protected form of RAM is used to store information such as your printer's configuration menu. Configuration options you have chosen, such as emulations, memory settings, and input bins, are saved to this non-volatile RAM. This information is not lost when you turn off your printer.

Physical Memory

Physical memory refers to the amount of RAM installed in the printer.

Virtual Memory

Virtual memory extends the effective size of the printer's memory by using a disk file or swap file to simulate additional memory space. It enables the hard disk to accept data swapped from RAM to free temporarily the RAM for other tasks.

Flash ROM

Quick loading, reprogrammable memory that holds information even when the printer is turned off is known as flash ROM. Your 1660 Print System has flash ROM available to hold system code and future system upgrades. The chief advantage of flash ROM is that system upgrades can be loaded from your computer without the necessity of swapping out expensive EPROMS or having to place a service call.

Spool

Spooling is temporary storage to hold print jobs until the printer is available to process them.

Evaluation of Your Printing Environment

The first step in allocating your printer's memory is to define your printing needs. Each of your printer's features requires a minimum amount of memory. If you use a feature, you must allocate enough memory to the client which controls it. On the other hand, if there are features you don't use, you can take the memory in the clients that

control the unused features and assign it to other clients that need additional memory.

Evaluation Questions

To get a better idea of what your printing requirements and your printer's capabilities are, answer the following questions:

1   How much RAM does your printer have (standard and additional memory)?

2   Do you have the option of installing additional memory if it's needed?

3   Does your printer have any internal or external hard disks connected? If so, how many and what size?

4   Which resident emulations will you be running?

5   Will you be loading any non-resident emulations? If so, how many and which ones?

6   How many printer ports will be connected?

7   Do you have an optional interface connected?

8   How many people will be using this printer simultaneously?

9   How many downloadable fonts will you be using? What sizes? From which emulation?

10 Will you use many different sizes of fonts/typefaces?

11 How large are the files you typically print? How large is the largest file you'll be printing?

12 Are most of your files text, or are any graphics intensive?

13 Will you want to download fonts, forms, or operators to memory?

14 Will you be collating documents? If so, how large and complex will these documents be?

15 What media sizes will you be using?

16 At which resolution will you be printing?

After you have answered all of these questions, read the following sections to find out which memory clients control features you plan to use and which memory clients control features you don't need.

Memory Clients

Memory clients are users of printer memory that are dedicated to a specific purpose. Each of the memory clients is located in the Administration/Memory menu. When you allocate memory to a specific client through the control panel, it's allocated in kilobytes (KB). Each time you make changes in the Administration/Memory menu, print out a status page to confirm the memory reallocation.

» **Note:** *The value for each memory client must be divisible by 4 KB. Therefore, if a value is entered that is not evenly divisible by 4 KB, it's automatically converted to the next lower value that's divisible by 4 KB. For example, if you enter 102 KB, the actual value is lowered to 100 KB, assuming there is enough memory available to allocate to this client. See the "Memory" section of chapter 4, "Printer Configuration," for each memory client's minimum and default settings.*

Frame Buffer

The Frame Buffer memory client holds rasterized or bitmapped images of page faces which are ready to be sent to the print engine. A frame holds the contents of each single page image.

Because the frame buffer memory is so critical to the actual printing of a page, its allocation takes precedence over that of other memory clients. The number of frames needed to print at engine speed is engine specific and depends on the size media and resolution. For example, printing at 600x600 dpi requires four times the amount of memory in the frame buffer than does 300x300 dpi.

If you are uncertain about how to configure your printer's memory, use only the Administration/Memory/Frame Buffer menu. Or use this menu as a starting point before trying manually to configure your printer's memory. It provides a simple method of defining how much memory should go to each of the clients for the most complicated printing conditions in your environment. Menu options allow you to

specify the largest media size you plan to use for each resolution. Memory is then automatically allocated to the clients that require it.

» **Note:** *The printer does not allow you to choose features that do not work with the amount of memory currently installed.*

Using the Frame Buffer option does not change the media size. It just ensures that you have enough memory allocated to the appropriate clients to print on the requested media size.

Menu	Administration/Memory/Frame Buffer/300 dpi
Choices	12x19
Default	12x19

Menu	Administration/Memory/Frame Buffer/600 dpi
Choices	11x17, 12x19, A3, A4, A5, B4, B5, B6, executive, full ledger, legal, letter, postcard, and universal
Default	11x17

Menu	Administration/Memory/Frame Buffer/1200 dpi
Choices	11x17, 12x19, A3, A4, A5, B4, B5, B6, executive, full ledger, legal, letter, postcard, and universal
Default	letter

Minimum Frame Buffer Size for Imageable Area

The following table lists the minimum number of KB that must be devoted to the frame buffer for all media size and resolution combinations.

Media	Minimum Frame Buffer Size (in KB)		
	300x300 dpi	600x600 dpi	1200x600 dpi
11x17 12x19	1976 2428	7852 9660	15668 19228
A3 A4 A5 A6/Postcard	2052 1004 492 240	8164 3980 1940 944	16252 7940 3864 1860
B4 B5 B6	1528 748 372	6072 2964 1444	12076 5892 2868
Executive	788	3124	6220
Full Ledger	2164	8604	17124
Legal Letter	1252 968	4968 3848	9868 7676
Postcard/A6	240	944	1860
Universal	2112	8400	16720

Display List

Also known as K Mem Display, this client stores compressed representations, or blocks, of the pages to be printed. It takes approximately one compressed block for a normal 8.5" x 11" (215.9 mm x 279.4 mm) text page, four compressed blocks for an 8.5" x 11" (215.9 mm x 279.4 mm) page that includes some graphics, and as many as 500 compressed blocks for an extremely complex page.

Many pages of compressed blocks belonging to multiple print jobs can be stored at the same time in the display list. If enough memory is allocated to this memory client, a page can always be ready to print as soon as another page has been imaged to the print engine.

The amount of memory required for each compressed block is printer specific. The QMS 1660 Print System takes approximately 64 KB of memory from the display list for each compressed block. However, if a page includes raster image data (for example, TIFF or bitmap data), each compressed block will require much more memory.

Increasing the amount of memory in this client may improve printing throughput and minimize slowdowns due to collating or printing complex pages. If not enough memory is allocated to this client, memory is taken from the excess memory client to complete a print job.

PostScript Font Cache

Also known as K Mem PS Fonts and Font Cache, this memory client stores bitmapped representations of previously scaled PostScript fonts. This process reduces the number of times a font must be converted from outline form to bitmap form. Printing pages that have characters already stored in the font cache is immensely faster than printing characters not yet in the font cache.

As the font cache memory fills, the printer makes room for new bit-mapped characters by erasing those that have been in the cache longest without being used. By increasing the memory allocated to this client, the printer can store more characters and spend less time erasing and replacing characters in the cache. This client has a limit to the maximum point size it will store.

Normally, you don't need to change this memory client unless you use a large number of fonts at various point sizes. If you do, you may allocate additional memory to this client to improve printer performance. There's no specific formula to use in figuring the amount of memory required by the font cache, but after a certain point, large font caches cause the printer to take longer to print than smaller font caches because of the search time through the cache. The recommended font cache size is in the following ranges:

■ 128-256 KB for 300x300 dpi printing

■ 256-512 KB for 600x600 dpi printing

■ 256-512 KB for 1200x600 dpi printing

You should experiment to see what font cache size works best for you.

PS Heap

Also known as K Mem PSHeap, Heap, PostScript VM, and Virtual Memory, this client holds downloaded fonts, PostScript operators, and forms.

Inefficiently coded PostScript jobs can consume an extremely large amount of virtual memory or leave objects in the PostScript heap after the print jobs are completed, leading to virtual memory errors. If not enough memory is allocated to the PS heap, the job cannot print.

Increasing the memory allocated to this client allows more complex jobs to print and increases the number of fonts that can be downloaded to virtual memory. However, this client should be increased only if you receive a virtual memory error when attempting to print a job or download a font, and even then it should be increased only in small increments until the error message goes away. Excess memory in the PS heap is not used.

Emulation

Also known as K Mem Emulation, this client is used to store any optional or loadable emulations, such as LN03 Plus or QUIC II. Increasing this client's memory allows you to load more than one optional emulation so that it doesn't have to be reloaded every time the print job is sent.

If an emulation is loaded to process a print job and there is not enough memory in the emulation client, another emulation already loaded may be unloaded automatically to obtain enough memory. If you notice a delay in printing between jobs that have different non-resident emulations, it's possible that the emulations are having to reload each time they're run. Adding to the emulation client may eliminate the unloading and reloading of these emulations and, consequently, increase throughput.

Also increase the emulation client if you're printing complex non-PostScript jobs that may require more memory to process correctly.

Temporary Emulation

Also known as K Mem Emul Tmp and Emulation Temporary, this client sets the amount of system memory to be used by non-PostScript emulations for storing downloaded fonts, forms, and macros. By dedicating a portion of memory to this client, your printer can perform "context switching," the ability to retain downloaded fonts and forms even after the printer changes from one emulation to another. Context switching prevents unnecessary repetitive downloading and traffic congestion on networks.

Normally, this memory client doesn't need to be changed unless you plan to download many different non-PostScript fonts.

Spool Buffers

Also known as Host Input and K Mem for Spool, this memory client stores incoming data from all the interfaces until the emulation can process the print job. When enough memory is allocated to this client, the host becomes free more quickly, and the number of jobs that the printer can accept simultaneously is increased. You should consider the amount of data being sent simultaneously when allocating memory to the spool buffer. If available, a hard disk can supplement this client with additional memory needed for spooling. See the "Hard Disk Management" section later in this chapter.

» **Note:** *While increasing this client is beneficial in reducing network traffic, throughput is not necessarily increased. In addition, making this client too large could actually decrease throughput because of the overhead involved with managing a large spool.*

Disk Cache

This memory client stores frequently used data in system memory instead of continually storing and retrieving it from a hard disk. If a hard disk is used and a lot of disk access is required, adding memory to the disk cache may increase the printer's performance. For example, if many fonts are stored on disk, faster access to these fonts is achieved by increasing the disk cache size. Conversely, if no hard disk is used, the disk cache should be set to 36 KB until a hard disk is installed and formatted. However, when one or more hard disks are

installed and formatted, they are not available until the disk cache client is increased.

The disk cache is a high speed temporary buffer for data going to and from the hard disk. It can speed the printer in two ways:

■ Information such as frequently referenced fonts and logos may still be in the cache and may not have to be pulled off a hard disk each time they're needed.

■ Information being written to a hard disk can be held in the cache temporarily until a more convenient time to be written to disk.

The amount of memory needed for the disk cache client is dependent on the size of the disk, the number of disks, the number of subdirectories on each disk, and the amount of memory dedicated to caching. As long as the disk cache is enabled and there is enough memory in the disk cache, all disks are accessible. If insufficient memory is allocated to the disk cache, some disks may be seen while others are not.

The recommended amount of memory for the disk cache client is as follows:

■ 20 KB internal usage

■ 0.5 KB per MB of disk storage total for all disks

■ 100 KB of memory dedicated to caching

For example, the recommended amount of memory for the disk cache for a single 120 MB hard disk would be 180 KB, and for two 120 MB hard disks it would be 240 KB.

» **Note:** *After you format a hard disk and the* `FORMAT COMPLETE` *message is displayed in the message window, the formatted disk may not be available to the system until the printer is turned off and then on again.*

You can increase the disk cache size in the following ways:

■ Add more memory, which automatically increases the disk cache client's size. See chapter 6, "Printer Options," for information on installing additional printer memory (SIMMs).

■   Set Administration/Memory/Enable Disk Swap to Yes. Any extra memory is distributed to all memory clients.

■   Take any memory, if available and not being used by other clients, and add it to the Administration/Memory/K Mem Display memory setting.

▲   **Caution**: *This option should be used only by individuals who are familiar with adjusting memory client's values. Incorrect use of this option could cause the system to operate incorrectly.*

MB Printer Mem

This field shows the size of the physical RAM installed in the printer. If a hard disk is installed and disk swapping is enabled (Administration/ Memory/Enable Disk Swap), this field also gives the size of available virtual memory.

System Memory

Also known as System Use, this non-configurable client is the amount of RAM used to run the printer's operating system. It's never increased or decreased. The system memory subtracted from the total amount of RAM identifies the amount of RAM available for all the other memory clients.

Hard Disk Management

You can add one internal IDE hard disk and up to three external SCSI hard disks to your QMS 1660 Print System. These hard disks serve as secondary storage places for such items as downloaded fonts, emulations, and spooled data.

»   **Note:** *Hard disk specifications are included in Q-FAX document 6502, "QMS-tested SIMMs and Hard Disks." This document contains a description of each approved hard disk, its manufacturers and part numbers, and the QMS products on which it can be used. See appendix A, "QMS Customer Support," of this manual to find out how to access Q-FAX documents.*

Virtual Memory Support

Your printer supports virtual memory capabilities for the spooling buffer (Administration/Memory/K Mem for Spool menu) and the display list (Administration/Memory/K Mem Display) clients when a hard disk is installed and disk swapping is enabled (Administration/Memory/Enable Disk Swap menu). These capabilities extend the amount of memory available for certain supported features, such as spooling and collation. If all of the memory in the spooling buffer or display list is being used Enable Disk Swap is enabled, the printer stores the "overflow" on a hard disk.

» **Note:** *Chunk collation begins automatically after 50 pages regardless of how much memory is available to the display list client.*

Specific Printing Environment Example

Since configuring memory is not an exact science, it may be helpful to see how others in various printing environments have allocated their printer memory to meet their printing needs best. The following examples are to be used only as a guideline for configuring your own printer's memory.

Example

A QMS 1660 Print System with 12 MB of RAM. As many as 35 people use this printer, sending text and graphics PostScript files to be printed on 8.5" x 11" (215.9 mm x 279.4 mm) and 11" x 17" (279.4 mm x 431.8 mm) media. They have configured their printer to print at 600x600 dpi.

This is what their Current Memory Configuration box on their status page looks like:

Location	Size
Host Input:	188 KB
Display List:	204 KB
Font Cache:	164 KB
Heap:	1356 KB
Framebuffer:	7852 KB
Emulation:	844 KB

Emulation Temporary:	256 KB
Disk Cache:	36 KB
System Use:	128 KB
Total Memory:	12288
PostScript Emulation VM:	1026716
VM allocated:	89940
VM remaining:	936776
Paper Size:	11" x 17"
Resolution:	600

End Job Mode

When sending print jobs through the serial and parallel protocols, some applications and their printer drivers append an end-of-document command (EOD) to each print job to ensure that each file prints correctly. The reason for this is that some protocols and print queuing systems send print jobs to the printer as one continuous data stream (one print job immediately following another).

But the problem with this system is that some applications are limited by the printer language and are unable to produce an EOD command. This becomes even more problematic when you're printing to a QMS 1660 Print System, where print jobs of all supported emulations can be received simultaneously. ESP technology examines the first part of each print job to determine its emulation. Once the emulation is identified, the print job processes without further checking. This minimizes any slowdown resulting from the sensing process. To help ESP technology determine the proper emulation of successive print jobs, the printer must be able to identify the end of job for each job.

Therefore, unless a wait timeout (the amount of time the printer is waiting on data from the host) occurs and ends each print job, or unless you add an EOD command between each file being printed through these protocols, some print jobs may be interpreted by the printer as one job and may "run" together. See chapter 4,"Printer Configuration," for more information on emulation timeout.

When printing multiple jobs with little or no time delay and with no EOD command between each job, the serial and parallel protocols may be unable to detect an end of job automatically. So the End Job Mode feature on QMS Crown printers was designed to allow you to set the end of document for print jobs being sent through these protocols.

Common Reasons to Use End Job Mode

If you are printing via the serial and parallel protocols, and one of the following conditions exists, you may need to set the end job mode:

■ Multiple print jobs with little or no time delay and with no EOD commands have been sent to the printer and the message window displays only one active job.

■ Multiple print jobs of the same printer language have been sent to the printer and they print on the same page. (For example, you send the AUTOEXEC.BAT file with no EOD command followed with little or no time delay by the CONFIG.SYS file, and they both print on the same page.)

■ Multiple print jobs of different printer languages "run" together as if they are a single print job. (For example, you send a PCL print job followed by a PostScript print job, and the PCL job prints and is followed by what appears to be program code instead of your PostScript print job.)

■ You want to print multiple jobs with header pages.

■ You want to print multiple jobs where job separation is important.

When your printer is in ESP mode, printing multiple jobs through the serial and parallel protocols and end job mode is not set, ESP technology interprets the emulation for only the first job. The print jobs that follow are interpreted as being the same emulation as the first job. For example, if there are two print jobs, the first a PCL file with no EOD command, and the second a PostScript file with a Ctrl-D (a PostScript end-of-file character)—ESP technology interprets the emulation of the first job correctly. But since the first print job has no EOD command, it "runs" into the second job, and even though the second job is PostScript, it prints in PCL.

Using the EOD Commands

Since the serial and parallel protocols may not be able to detect an EOD automatically, due to a lack of an EOD command in some printer languages, you can insert an EOD command at the end of your file to tell the printer where your print job ends. QMS Crown printers recognize two end-of-document commands: QMS EOD and HP EOD.

These commands are functionally the same. They enable data stream sensing for the EOD command, allowing your host computer to control print job separation. The QMS EOD and the HP EOD commands perform an end of document for all of the printer emulations supported on your printer (PostScript, HP-GL, HP PCL, and Lineprinter).

See your system administrator or applications development department to have them identify the standard EOD command for your organization, or to have them select a standard EOD command.

Setting the End Job Mode for the Serial and Parallel Protocols

Your printer can be connected through the serial or parallel interface to a stand-alone PC, to a PC print server, or to some other type of print queuing system. This section provides a quick guide to the steps needed to set the end job mode for each environment. The following sections provide more detailed information for each step.

Stand-Alone PC

1   **Set the end job mode from the printer's control panel.**

2   **Add the EOD command to your file.**

»   **Note:** *If using steps 1 and 2 is not feasible in your stand-alone PC environment, you can alternatively use a program that either causes an emulation timeout or that inserts an EOD command between each print job. See your QMS vendor for more information on this type of program.*

PC Print Server

1   Set the end job mode from the printer's control panel.

2   Create a job separator to append an EOD command and send it between each print job.

Other Print Queuing Systems

If you use a print queuing system other than a PC print server and you experience what appears to be an EOD command problem, you may need to use another procedure, such as a print utility, an initialization sequence, or a header page to add an EOD command. See your print queuing system documentation, your network administrator, or your QMS vendor for more information.

Setting the End Job Mode via the Control Panel

Use the following procedure to set the end job mode from the printer's control panel for printers connected via the serial or parallel interface to a stand-alone PC, a PC print server, or some other type of print queuing system.

»   **Note:** *If you print both serial and parallel protocol jobs, then you must set the end job mode for each protocol.*

Wait for the printer to go idle, and then press the control panel keys in the order shown in the following instructions to access the End Job Mode option. The printer responds by displaying a status message in the message window.

»   **Note:** *You may need to press the Next key one or more times to advance through the list of selections or options.*

Key	Purpose	Message Window
Online/ Offline	Turns off the Online/Offline indicator and readies the printer for configuration.	`IDLE`
Menu	Accesses the configuration menu.	`CONFIGURATION OPERATOR CONTROL`

Next	Advances to the Operator Control/Administration menu.	`CONFIGURATION` `ADMINISTRATION`
Select	Accesses the Administration menu	`ADMINISTRATION` `COMMUNICATIONS`

Next	Advances to the Communications/Parallel (or Serial) menu.	`COMMUNICATIONS`
		`PARALLEL (`*`or`*
		`SERIAL)`

Select	Accesses the Parallel (or Serial) menu.	`PARALLEL/SERIAL` `MODE`
Next	Advances to the Parallel (or Serial)/End Job Mode menu.	`PARALLEL/SERIAL` `END JOB MODE`
Select	Accesses the End Job Mode menu.	`END JOB MODE` *`OPTION`*
Next	Advances to the appropriate option (QMS EOD, HP EOD, or None).	`END JOB MODE` *`OPTION`*
Select	Selects the option.	*`OPTION`* `IS SELECTED`
	Returns to the Parallel (or Serial)/End Job Mode menu.	`PARALLEL/SERIAL` `END JOB MODE`
Online/Offline	Asks you if you want to save your change.	`SAVE CHANGES?` `NO`
Next	Advances to the Yes option.	`SAVE CHANGES?` `YES`
Select	Saves your change and idles the printer.	`IDLE`
Online/Offline	Puts the printer back on line.	`IDLE`

Adding an EOD Command to Your File

When adding an EOD command to your file, use the syntax for the selected EOD command exactly as written (the command's syntax is case sensitive).

» **Note:** *<ESC> represents the escape character. (The decimal value for the escape character is 027, and the hexadecimal value is 1B.) How you enter the escape character depends on your application. Some applications allow you to press and hold the ALT key and then type 027 to enter the escape character, while others allow you to type certain character sequences to represent the escape character. See your computer or application documentation to find out how to enter the escape character on your system.*

For this EOD command...	Use this syntax...
QMS EOD	%%EndOfDocument <CR><LF>
HP EOD	<ESC>%-12345X

» **Note:** *The <CR><LF> sequence following the %%EndOfDocument line for the QMS EOD is necessary to avoid an INPUT IDLE message remaining in the printer message window after the document finishes printing.*

When the QMS EOD or the HP EOD is set, the printer does not recognize the Ctrl-D EOD command. Add your organization's standard EOD command to the end of your print file, or add it to a separate file as follows.

Adding an EOD Command to the End of Your File

Create an output file (for example, ASCII, PCL, or PostScript file to disk) and add your organization's standard EOD command (QMS EOD or HP EOD) to the end of that file.

Sample output file:

```
Text
Text
Text
Text
%%EndOfDocument
```

Adding an EOD Command to a Separate File

Create an ASCII text file that contains only the EOD command. For example, create a DOS batch file listing each print filename followed by the EOD command filename for each file being printed. Then "run" the batch file to print your list of files.

Sample DOS batch file:

Command	Explanation
Print mktg.doc	Job filename
Print end.txt	EOD command filename
Print acct.doc	Job filename
Print end.txt	EOD command filename

Creating a Network Job Separator

If your printer is connected to a network through a PC and the PC is acting as a print server managing the printing of shared network files, then your system administrator must create a job separator and associate it with a print job queue. Different network environments have different procedures for creating the job separator, such as initialization sequences, custom banner pages, print job headers, or print job trailers. The print server does not necessarily send multiple print jobs to the printer in the order that you queued them to the printer. The network job separator is accessed with each print job, so this ensures that network job separation is enforced. See *QMS Crown Network Notes* for more information on how to create a network job separator for several commonly used networks.

Parallel Interface Modes

In addition to Centronics parallel communication, your printer's parallel interface provides IEEE1284 bidirectional parallel communication, which supports five modes of operation. The printer automatically recognizes and uses the mode dictated by the host.

Byte Mode

Printer-host communication is done in bytes.The byte mode may be used by the host device in a DMA (Direct Memory Access) mode for more efficient operation.

When byte transfer is complete and there is no more data to transmit, the host may do one of the following:

- Terminate and return to the compatibility mode.

- Stay in the Host Busy, Data Not Available phase.

- Set Host Busy Low, putting the interface into the idle phase.

If there is additional data, the host may do one of the following:

- Set Host Busy Low, indicating that the host can accept additional data.

- Stay in the Host Busy, Data Not Available phase.

- Terminate and return to the compatibility mode.

Check your host documentation to see if the host is 1284 compatible.

Compatibility Mode

Printer-host communication is done in a manner that ensures compatibility.

ECP (Enhanced Compatibility Port) Mode

This is an advanced version of byte mode which allows transfer of data in either direction without returning to the compatibility mode. The communication is a half-duplex channel with either device, the host or the printer, making a request for data transfer when there is available data. In the case of simultaneous requests for transfer, the printer always defers to the host.

EPP (Enhanced Parallel Port) Mode

Printer-host communication is done via asynchronous bidirectional eight-bit transfer. A return to compatibility mode is not required.

Nibble Mode

Printer-host communication is done in nibbles (four bits; one-half byte) with the low order nibble sent first. A transfer of two nibbles is required for each byte of information.

PS Protocol Option

Your QMS 1660 Print System supports PS Protocol, a new protocol for communication between the printer and a host computer over the serial, parallel, and optional interfaces. This binary communications protocol (BCP) allows any 8-bit binary value (0-255) to be treated as data, while allowing a few of the values to function as special control characters. When communicating 8-bit binary data in binary or binary fixed mode, the printer uses the quoting mechanism of the binary communications protocol to distinguish between the special control characters and print job binary data.

To differentiate data from the special control characters, any data that is the same as one of the following special control characters must be quoted.

ASCII Keyboard	ASCII Name	ASCII Hex	Control Function
^A	SOH	0x01	Quote data character
^C	ETX	0x03	Abort job and flush to end of file
^D	EOT	0x04	End-of-file marker
^E	ENQ	0x05	(Reserved for future use)
^Q	DC1	0x11	XON in XON/XOFF flow control
^S	DC3	0x13	XOFF in XON/XOFF flow control
T	DC4	0x14	Job status request
^\	FS	0x1C	(Reserved for future use)

A data byte is quoted by replacing it with a two-character sequence. The first character is a ^A (ASCII hex 0x01), and the second character is the character itself XORed with the ASCII value 0x40. For example, to send the value 0x14(^T) as data, send the two-character sequence 0x01 0x54 (^a T) instead. (ASCII "T" is the result of XORing ^T with 0x40).

This method of quoting guarantees that whenever the printer receives any of the eight control characters, the control function is intended regardless of whether the preceding character is a ^A. Any data byte not equal to one of the eight special control characters is transmitted by sending the data byte.

For more information on BCP and quoting, see the *PostScript Language Reference Manual* (Adobe Systems, Inc., Reading, MA: Addison-Wesley, 1990, ISBN 0-201-18127-4), the "Adobe Serial and Parallel Communications Protocols Specification" (in *Adobe Developer Support.* Adobe Systems, Inc., February 14, 1992), and the "PostScript Language Reference Manual" (in *Supplement for Version 2011*, Adobe Systems, Inc., January 24, 1992).

Options

The following options are available in the PS Protocol menu.

Menu	Administration/Communications/*Interface*/PS Protocol	
Choices	**Name and Description**	**Interfaces**
	Normal—Enables standard, ASCII hex protocol. Data is sent and received in ASCII format. This mode is recommended if you do not print binary data. It was designed for data in the printable ASCII range. Print jobs can alter the PS protocol value through PostScript operators.)	LocalTalk, Parallel, Serial, Ethernet, Token-Ring
	Normal Fixed—Enables standard, ASCII hex protocol. Print jobs cannot alter this value through PostScript operators.)	LocalTalk, Parallel, Serial, Ethernet, Token-Ring
	Binary—Enables binary communications protocol. Print jobs can alter this value through PostScript operators. Data in the printable ASCII range also prints)	LocalTalk, Parallel, Serial, Ethernet, Token-Ring
	Binary Fixed—Enables binary communications protocol. Print jobs can not alter this value through PostScript operators. Data in the printable ASCII range also prints.)	LocalTalk, Parallel, Serial, Ethernet, Token-Ring
	QBinary (Quoted Binary)—Enables binary communications protocol. Print jobs can alter this value through PostScript operators. Data in the printable ASCII range also prints. Use the special quoting mechanism for the special characters and ^D (EOF).	LocalTalk, Ethernet, Token-Ring
	QBinary Fixed (Quoted Binary Fixed)— Enables binary communications protocol. Print jobs cannot alter this value through PostScript operators. Data in the printable ASCII range also prints. Use the special quoting mechanism for the special characters and ^D (EOF).	LocalTalk, Ethernet, Token-Ring

Default	Normal
Notes	A data stream sent through the serial or parallel interface using Binary is treated the same as a data stream sent through an optional network interface using QBinary. However, a data stream sent through an optional network interface using QBinary is not treated the same as a data stream sent through the same interface using Binary.

Advantages

The main advantage of using the Binary and Fixed Binary PS protocol modes when sending binary data is that these modes compress the data stream allowing your documents to be smaller so you can send smaller jobs to the printer. For example, some device drivers can format bit map images as binary data instead of as ASCII hex data.

Implementation

To implement PS protocol for sending binary data on your system you need a device driver available with some applications or operating systems, or you can alternatively use a program to read the data and write out the quoted characters. See your QMS vendor for any available information on device drivers or binary filter programs.

HP-GL Color Encoding

The term "pen" in the HP-GL emulation refers to a logical pen (in other words, the current pen position) rather than to a physical pen on a plotter. A pen and a pen color are selected to draw images. This emulation supports 8 pens and pen colors.

Since your QMS 1660 Print System is a monochrome (black and white) printer, the pen colors are converted to shades of gray. The default color mappings for the 8 pens are as follows:

Pen	Pen Color	Level of Gray
1	Black	100%
2	Black	100%
3	Red	70%
4	Green	41%
5	Blue	89%
6	Violet	59%
7	Orange	25.8%
8	Brown	50%

» **Note:** *The default color for both pen 1 and pen 2 is black. However, the pen width for these two pens is different. Pen 1 is 0.7 mm and pen 2 is 0.3 mm.*

The printer maps each pen to its assigned color, then converts the color to a grayscale using the National Television System Committee (NTSC) standard equation for encoding color. This equation converts a given set of CMYK values to grayscale. For the 8 pen colors assigned to pens 1 - 8, the printer uses the designated grayscale; for any other pen color, the printer uses the following equation:

$$[(C*0.3) + (M*0.59) + (Y*0.11) + K] \div 255$$

» **Note:** *This equation assumes that each grayscale is a byte value that ranges from 0 to 255 (100%). If the sum of the left-side (calculation in brackets) of the NTSC equation is greater than 255, then the sum is set equal to 255.*

Example

Any color can be reproduced by using some combination of CMYK. If you have defined the following CMYK values for the color brown in your application, the NTSC equation that follows shows you how the percentage of grayscale for the color is derived.

CMYK Value
C (96)
M (128)
Y (224)
K (0)

$[(96*0.3) + (128*0.59) + (224*0.11) + 0] \div 255 = [(28.80) + (75.52) + (24.64) + 0] \div 255 = 50\%$

❖

6

Printer Options

In This Chapter . . .

- Additional paper cassettes, paper feeder, and paper cassette supporter, and paper output ramp
- Font and security cards
- Downloadable emulations
- Single in-line memory modules (SIMMs)
- Intellifont proms
- Network interfaces
- Internal and external hard disks
- Software-loadable print system software

Introduction

QMS offers several options to expand the capabilities of your QMS 1660 Print System. The following are available for purchase from your QMS vendor:

■ Media input options—paper cassettes in all printer-supported media sizes, paper feeder, and paper cassette supporter

■ Paper exit ramp for 11.7" x 19.5"/297.18 x 495.30 mm media

■ Font and security cards

■ Downloadable emulations

■ SIMMs (single in-line memory modules)

■ Intellifont proms

■ Network interfaces

■ Storage options—IDE-SCSI hard disk board, internal IDE hard disk, and external SCSI hard disks

■ Kanji font internal IDE hard disk

■ Software-loadable print system software

If your vendor cannot offer these options for your printer, see appendix A, "QMS Customer Support."

Media Input Options

Paper Cassettes

Additional paper cassettes provide two main benefits:

■ Expanded flexibility
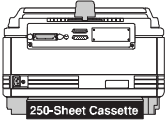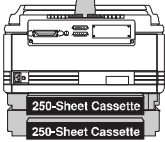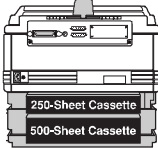
You can switch media size, color, and type without having to
unload and load media. Just slip one cassette out and another in.

■ Increased paper-feed capacity

Install a paper feeder and second cassette (as well as a cassette
support, if necessary), and then chain cassettes. (See chapter 3,
"Advance Printing Features," in the *Operation* manual for instruc-
tions.)

» **Note:** *When using dual cassettes, both cassette must be
installed in order to print.*

The QMS 1660 Print System has three user-installable media-input
configurations.

	Standard The 100-sheet multipurpose tray and 250-sheet standard cassette give you a total paper-feed capacity of 350 sheets.
	Dual cassette with paper feeder A paper feeder and a second 250-sheet cassette increase the printer's total paper-feed capacity to 600 sheets.
	Dual cassette with paper feeder and cassette supporter A paper feeder and cassette supporter allow you to install a 500-sheet cassette (letter/A4-size only), increasing the printer's total paper-feed capacity to 850 sheets.

Paper Feeder

The paper feeder allows you to

■ Install a second 250-sheet paper cassette, increasing the printer's total paper-feed capacity to 600 sheets.

■ Load two different types/sizes/colors of media and easily change between them by switching cassettes.

Because the paper feeder attaches to the bottom of the printer, no extra space is necessary. It is also easy to install.

Unpacking the Paper Feeder

1 **Take the paper feeder and rear cassette cover from the shipping carton.**

2 **Remove any tape and packing materials from the paper feeder and rear cassette cover.**

3 **Save the packing materials in case you ever have to move or ship the printer to a new location.**

Installing the Paper Feeder

1 **Turn off the printer and disconnect the power cord and all interface cables.**

   This allows easier installation.

2 **Remove the paper cassette from the printer.**

**3   Remove the connector cover on the lower-right rear of the
      printer.**

Lift the back side of the printer with your left hand, and pull the
connector cover away from the printer.
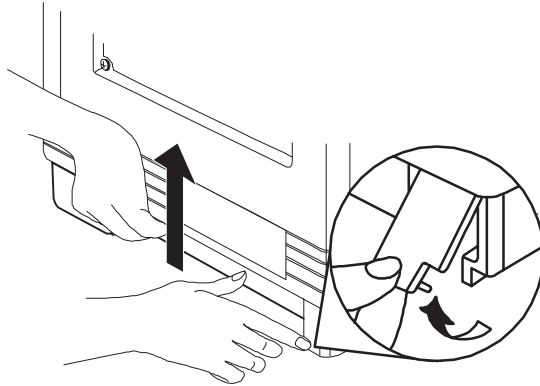
**4   Place the paper feeder on a stable, flat surface, with the cas-
      sette installation slot toward you.**

**5   Pull the green lock levers, located on the right and left of the
      paper feeder bottom, toward you to release them.**
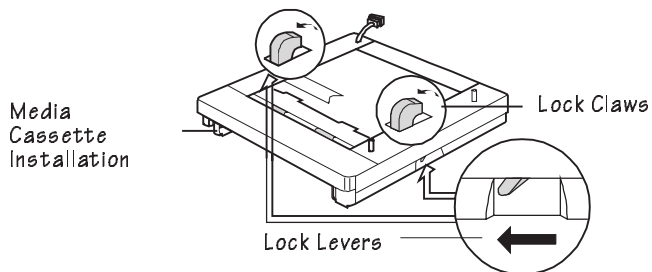
6   Move the connector cable located at the inner left of the paper
     feeder to the outside of the paper feeder.
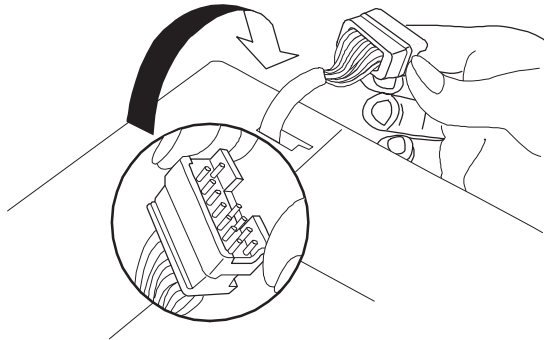
7   Place the printer on the paper feeder.

◆ **WARNING!** *The printer weighs about 50 lbs (23 kg). Don't lift it by yourself.*

ACHTUNG! *Der Drucker wiegt ca 23 kg; bitte versuchen Sie niemals, das Gerät alleine anzuheben oder zu tragen.*

Make sure the extrusions on the paper feeder are inserted into the holes on the bottom of the printer. Be careful that the connector cable is not caught between the printer and the paper feeder.
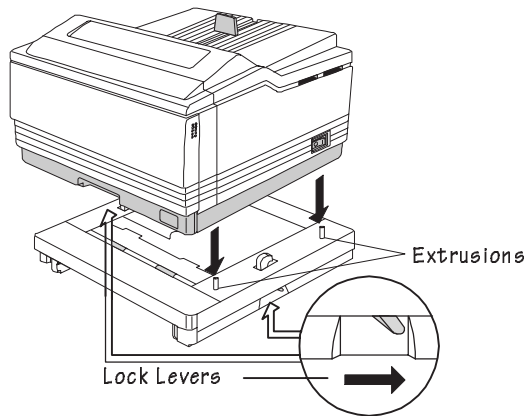
8   **Push the green lock levers, located at the right and left of the paper feeder bottom, to the rear to lock them.**

9   **Plug the paper feeder connector cable into the connector at the back of the printer.**

You moved this cable outside the paper feeder in step 6.
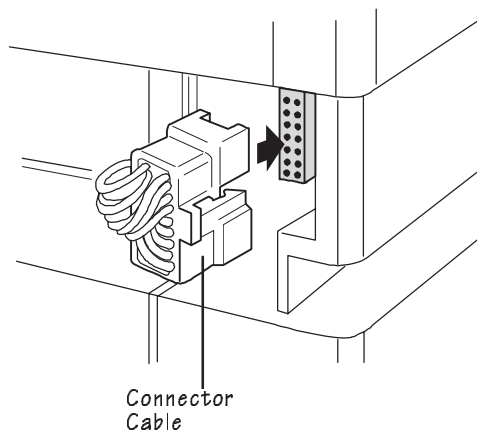
Connector
Cable

10   **Replace the connector cover on the printer.**

You removed this cover in step 3.

11   **Reconnect the printer power cord and interface cables, and then turn on the printer.**

12   **Replace the paper cassette you removed earlier, and install the second cassette.**

13   **If you are using a legal/B4-size or an 11" x 17"/A3-size paper cassette with the optional paper feeder, place the rear cassette covers on both cassettes, one at the rear of the printer and the other at the rear of the paper feeder.**

Removing the Paper Feeder

If you installed the paper feeder before the cassette supporter, you must first remove the paper feeder to install the cassette supporter.

Remove the paper feeder from the printer as follows (referring to the illustrations in the previous section if necessary):

1   Turn off the printer, and disconnect the power cord and all interface cables.

2   Remove the paper cassettes from the printer.

3   Remove the paper feeder from the printer.

Follow, in reverse order, the steps in the "Installing the Paper Feeder" section of this chapter. The following is a quick overview of the procedure:

a   Remove the connector cover.

b   Unplug the paper feeder's connector cable.

c   Unlock the green lock levers on the paper feeder (pull them toward you).

d   Lift the printer off the paper feeder.

e   If you are installing a cassette supporter, refer to "Installing the Cassette Supporter," later in this chapter.

Otherwise, continue with step f.

f   Replace the connector cover.

g   Reconnect the power cord and interface cables. Then turn on the printer and reinstall the paper cassette.

Cassette Supporter

The cassette supporter allows you to

■ Install a 500-sheet paper cassette, increasing the printer's total paper-feed capacity to 850 sheets.

■ Load two different types/sizes/colors of media and easily change between them by switching cassettes.

Because the cassette supporter attaches to the bottom of the printer, no extra space is necessary. It is also easy to install.

Unpacking the Cassette Supporter

1 **Remove the cassette supporter from the shipping carton and from its vinyl bag.**

2 **Save the packing material in case you ever have to move or ship the printer to a new location.**

Installing the Cassette Supporter

1 **If the paper feeder is already attached to the printer, remove it.**

Refer to the "Removing the Paper Feeder" section earlier in this chapter for instructions. The cassette supporter is installed on the paper feeder, and then the paper feeder is installed on the printer.

2 **Turn off the printer and disconnect the power cord and all interface cables.**

This allows easier installation.

3 **Remove the paper cassette from the printer.**

**4   Pull out the lock buttons on the cassette supporter until you
hear them click.**

The lock buttons are located on the bottom-left and bottom-right
of the cassette supporter.
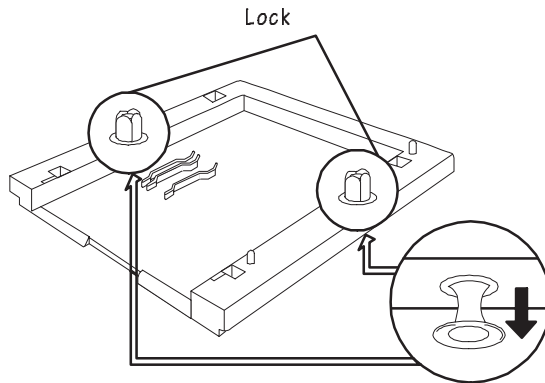
Lock

**5   Place the cassette supporter on a flat, stable surface with the
cassette installation slot toward you.**

6   Fit the holes on the bottom of the paper feeder onto the extrusions on the cassette supporter.

Extrusions
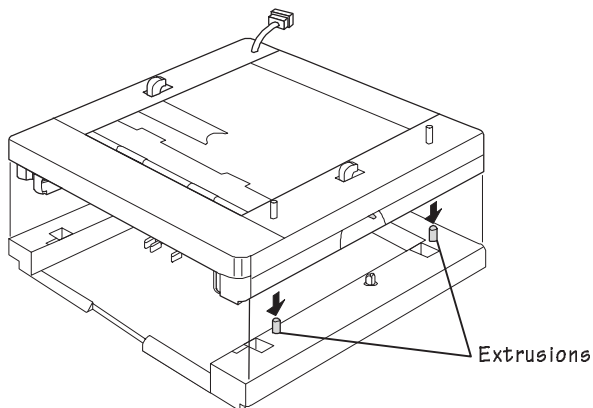
7   Lock together the paper feeder and the cassette supporter.

Stand the paper feeder and the cassette supporter on their ends. Then, using your thumb, push the lock buttons on the bottom left and right sides of the cassette supporter until you hear a click.

Lock
Buttons
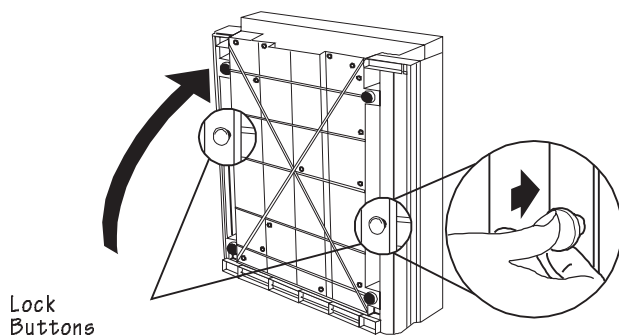
8   Attach the paper feeder to the printer.

See the "Installing the Paper Feeder" section earlier in this chapter for instructions.

Removing the Cassette Supporter

If you find it necessary to remove the cassette supporter from the printer, use the following procedure (referring to the illustrations in the previous section, if necessary):

1   Turn off the printer, and disconnect the power cord and all interface cables.

2   Remove the paper cassettes from the printer.

3   Remove the paper feeder from the printer.

Follow the steps in the "Removing the Paper Feeder" section earlier in this chapter.

4   Remove the cassette supporter from the paper feeder.

Follow, in reverse order, the steps in the "Installing the Cassette Supporter" section of this chapter. The following is a quick overview of the procedure:

a   Pull the lock buttons on the cassette supporter that lock it to the paper feeder.

b   Take the paper feeder off the cassette supporter.

c   Push the lock buttons in on the cassette supporter.

d   Reconnect the interface cables and power cord.

e   Turn on the printer.

500-Sheet Paper Cassette

Once you have installed a paper feeder and a cassette supporter, you can use a 500-sheet paper cassette to increase your printer's total paper-feed capacity to 850 sheets.

» **Note:** *500-sheet cassettes support only letter/A4-size media.*

Loading the 500-Sheet Paper Cassette

To ensure that all 500 sheets fit in the cassette and that the paper stack is properly leveled out, use the following procedure to load the 500-sheet paper cassette:

1 **Fan a stack of 500 sheets of paper, and align the paper on a flat surface.**

2 **Load the paper in three steps as follows:**

a   Up to the bottom limit mark

b   Halfway to the top limit mark

c   Up to the top limit mark

Top Limit

Bottom
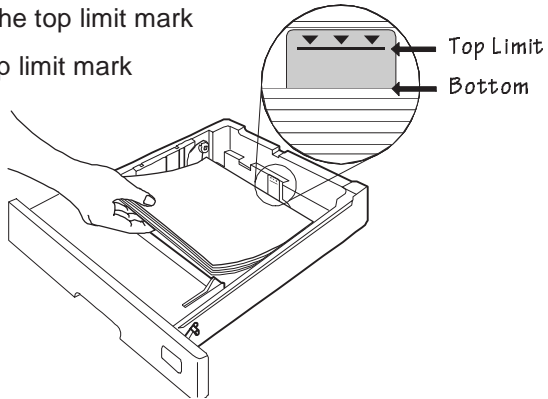
3 **Ensure that the paper stack lies flat, does not exceed the top limit mark, and is positioned under the retaining clips.**

Retaining Clips
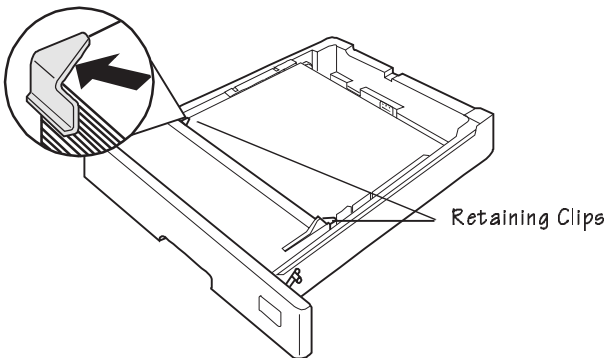
4   Insert the cassette in the cassette installation slot.

Push the cassette straight into the installation slot until it's firmly
seated.
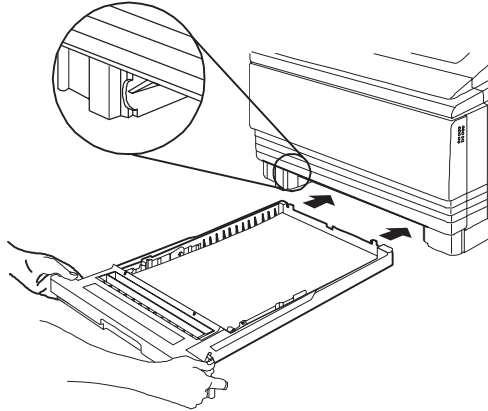
5   Adjust the media stop to fit the size paper you're using.

The printer delivers your output print-side down to the output tray
at the top of the printer. The media stop keeps the paper posi-
tioned correctly in the output tray.

Paper Output Ramp

The paper output ramp extends the QMS 1660's output tray to
accommodate 11.7" x 19.5"/297.18 x 495.30 mm media.

Use the following instructions to install the paper output ramp:

**1   Attach one of the Velcro pieces to the back of the media
stopper.**

2   Set the paper output ramp on top of the printer output tray.

---

3   **Attach the second piece of Velcro to the inside of the paper
output ramp, making sure it is aligned with the first piece you
attached.**

4   **Slide the paper output ramp along the output tray until the two
pieces of Velcro fit together snugly.**
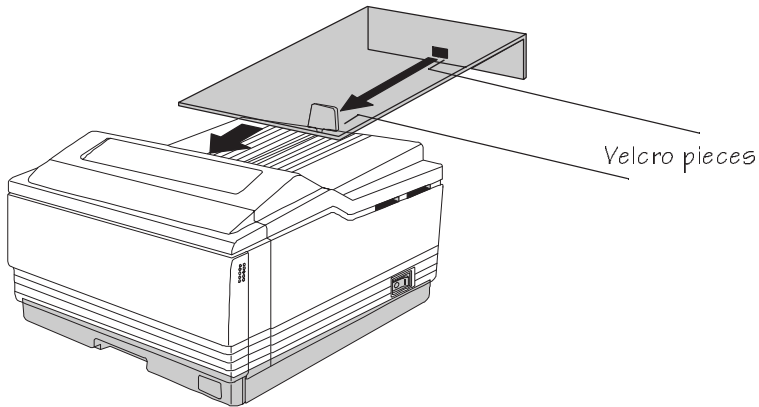
Velcro pieces

▲   **Caution**: *When removing the paper output ramp, carefully separate
the two Velcro pieces so as not to damage the media stopper.*

Font and Security Cards

The two PCMCIA (Personal Computer Memory Card International
Association) card slots allow you to use the following options to
increase the functionality of your printer:

■   Font cards—Such as Kanji fonts and the HP ProCollection for the
HP emulations on your printer

■   Security card—To password-protect the printer configuration
menu

The card slots are located on the right side of the printer below the
output tray. The printer supports up to two cards at once. You may insert
any type of card in either slot.

▲ **Caution:** *Your printer supports only QMS PCMCIA cards. These
cards are* not *backward compatible with previously released QMS
printers, and cards for previous printers are* not *compatible with your
printer.*

*In addition, some cards may require that you add more memory to
your printer.*

For a complete list of available font cards, contact your QMS vendor.

▲ **Caution:** *The printer must be off line (the Online/Offline indicator is
off) before you insert or remove cards. Press the Online/Offline key
once to take the printer off line. If you insert a font card in one of the
card slots without taking the printer off line, the card will not be
recognized.*

Using a Font Card

Use the following procedure to use a font card on your printer. If your
printer has a hard disk, you can install the font information from the
card onto your hard disk. See "Installing an Optional Font" later in this
chapter for instructions.

1   **If you are using an HP ProCollection font card, turn off the
printer.**

**Otherwise, press the Online/Offline key to take the printer off
line. (The Online/Offline indicator should be off.)**

2   Insert the font card.

You can use either slot,
but the card must be
inserted with the QMS
label side facing up. You
should feel the card snap
into place.
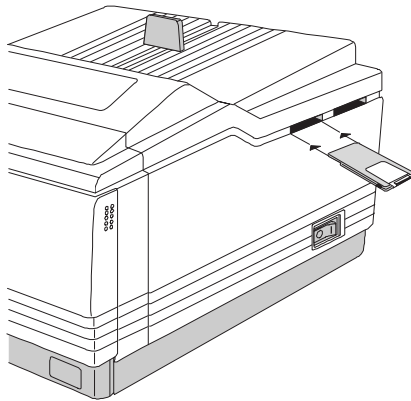
**3   Depending on the type of card you are installing, either turn
on the printer again or press the Online/Offline key to put the
printer back on line.**

The fonts are now ready to be used.

»   **Note:** *If you're using a font card, you should also make sure that
the printer driver you have installed for each application supports
the fonts on the card. If it doesn't, contact your application
manufacturer for support.*

Removing a Font Card

Use the following procedure to remove a font card:

**1   If you are using an HP ProCollection font card, turn off the
printer.**

**Otherwise, press the Online/Offline key to take the printer off
line.**

2   Pull out the card gently.

**3   Depending on the type of card you are removing, either turn
on the printer again or put it back on line.**

Using a Security Card

A security card allows the Operator Control and Administration menus to be password protected, so only users who know the password can change printer configuration settings. When a security card is inserted to one of the card slots, the Installation menu appears in the printer's configuration menu. See chapter 4, "Printer Configuration," for complete menu information.

▲ **Caution:** *The printer must be off line (the Online/Offline indicator must be off) before you insert or remove a security card. Press the Online/Offline key once to take the printer off line. If you forget to take the printer off line before you insert or remove a security card, turn the printer off and back on again to regain access to the data stored in the printer's memory.*

1   Take the printer off line.

The Online/Offline indicator should be off.

2   Insert the security card.

You can use either slot, but the card must be inserted with the QMS label side facing up. You should feel the card snap into place.
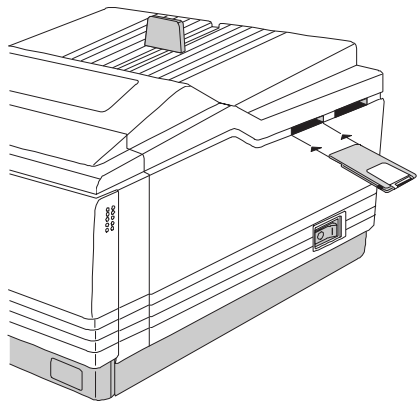
3 Select the password.

Use the Installation menu to password-protect the Operator Control and Administration menus. The Installation menu appears only when an optional security card is installed in your printer.

Menu	Installation/Operator Passwrd
	Installation/Admin Password
Choices	Up to 16 alphanumeric characters
Default	Blank
Notes	Enable the passwords in the Installation/Use Passwrd and Installation/Use Admin Pwd menus.

Chapter 4, "Printer Configuration," has complete information on using the configuration menu and selecting alphanumeric characters.

4 Enable the password.

Use the Installation menu to enable the passwords.

Menu	Installation/Use Operator Pwd
	Installation/Use Admin Pwd
Choices	On, Off
Default	Off
Notes	Select the passwords in the Installation/Operator Passwrd and Installation/Admin Password menus.

5 Put the printer back on line.

Using Passwords

■ When a password is required to enter the Operator Control or Administration menu, the message window displays

```
ENTER PASSWORD
```

when you use the Select key to enter the menu. Enter the password or press the Menu key to return to the menu. Chapter 4, "Printer Configuration," has complete information on using the configuration menu and on selecting alphanumeric characters.

■ If an invalid password is entered, the message window flashes

    ```
    INVALID PASSWORD
    ```

for three seconds and then returns you to the configuration menu. If you specify the correct password, access to the selected menu is granted.

■ If you forget the password, the system administrator can recover it by using the security card to access the Installation/Operator Passwrd and Installation/Admin Password menus again.

Removing the Printer and Controller Board Covers

✦ **WARNING!** *The following options which require access to the controller board—SIMM upgrades and optional network interfaces— should be performed only by a qualified QMS service technician.*

ACHTUNG! *Da beim Einbau der nachfolgend aufgeführten Optionen—Speichererweiteruntgen und Einbau optionaler Interfaces—Zugriff auf das Controller Board genommen werden muß, sollten diese Umrüstungen nur durch einen qualifizierten QMS Servicetechniker durchgeführt werden.*

The printer and controller board covers must be removed when a SIMM or an optional network interface is installed.

▲ **Caution**: *It's very important to protect the printer controller board from electrostatic damage while performing this task.*

*I**f an anti-static wrist strap is provided** in your printer option kit, attach one end of it to your wrist and the other end to any convenient electrical ground. The bare metal chassis of equipment, such as on the back of a computer, is suitable if it is plugged in but turned off. Never attach the wrist strap to any piece of equipment with an electrical current present. Turn off all power switches first. Plastic, rubber, wood, painted metal surfaces, and telephones are not acceptable grounding points. The printer isn't an acceptable grounding point either because it must be unplugged before you perform this task.*

If you don't have an anti-static wrist strap, *discharge your body's static electric charge by touching a grounded surface before you handle any printer boards or components and before removing the controller board cover. If you must walk around before completing your task, discharge your body's static electric charge again before touching the printer controller board.*

Procedure

✹ **WARNING!** *Turn off the printer and unplug the power cord before taking the cover off the printer.*

ACHTUNG! *Bitte schalten Sie den Drucker aus und ziehen Sie den Netzstecker heraus bevor Sie die Druckerabdeckung öffnen.*

1   **Turn off the printer, and then disconnect the power cord and all interface cables (parallel, serial, AppleTalk, and the optional interface[s]) from the printer.**

2   **Using both hands, open the multipurpose tray.**

3   **Open the printer's front cover.**

Push up on the release button, located on the top-right front of the printer.

**4   Remove and set aside the two screws, one on each end of
the front inside of the printer.**
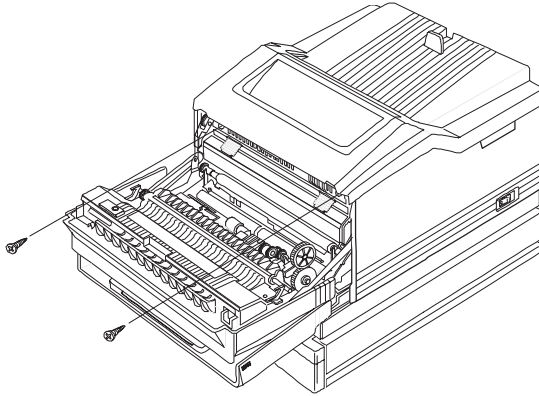
5   Remove the printer's cover.

a   Using both hands, lift the printer's cover.

b   Hold the cover with your right hand while you unplug the
connector cable from the printer.

c   Remove the cover and set it aside.

Connector Cable
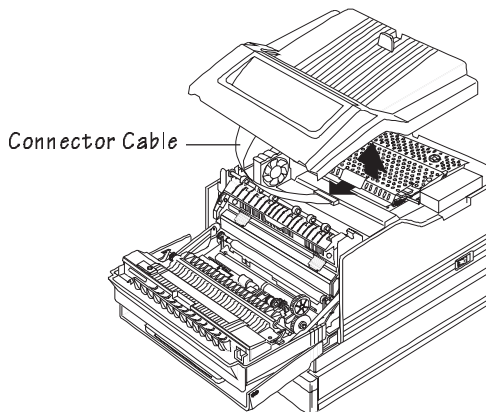
6 Remove the control board cover.

a Remove and set aside the 15 screws on the metal controller
board cover.

b Remove the metal cover and set it aside.
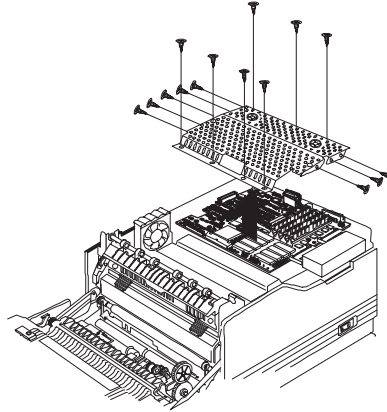
Replacing the Printer and Controller Board Covers

The printer and controller board covers must be reinstalled after a
SIMM or an optional network interface is installed.

▲ **Caution**: *It's very important to protect the printer controller board from
electrostatic damage while performing this task. Review the anti-
static guidelines in the "Removing the Printer and Controller Board
Covers" section, earlier in this chapter.*

Procedure

1   **Replace the controller board cover.**

   a   Place the metal cover on the controller board.

   b   Replace the 15 screws you removed earlier.
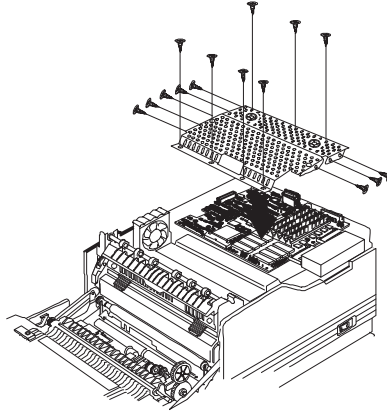
2   **Hold the printer's plastic cover over the top of the printer and slide the connector cable back into the printer's connector.**

Connector Cable
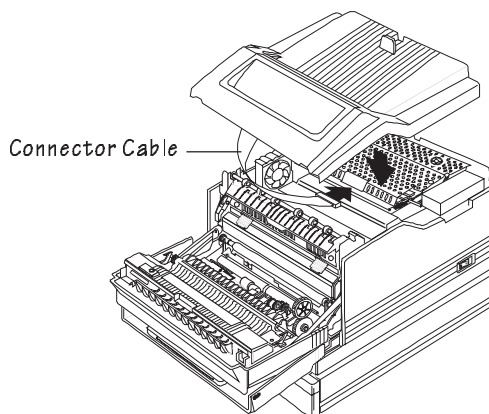
3   Replace the printer cover.

Lower the printer cover, and position it firmly on the printer. Then secure the cover to the printer by replacing the two screws you removed earlier.
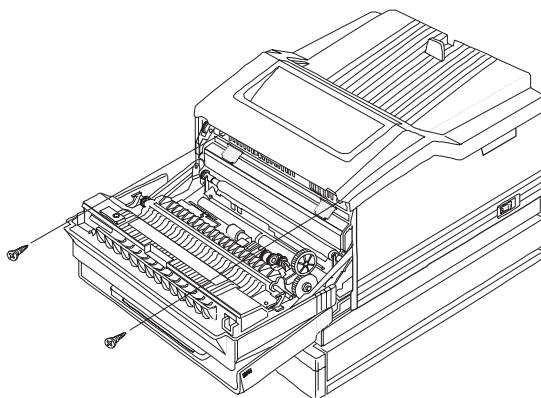
4   Reconnect all interface cables and the power cord, and then turn on the printer.

Single In-Line Memory Modules

Single in-line memory modules (or SIMMs) are compact circuit boards with surface-mount memory chips. Your printer comes in one of the following configurations:

■   12 MB RAM—one 4 MB and one 8 MB SIMM

■   24 MB RAM—one 8 MB and one 16 MB SIMM

However, you can replace one or both of the SIMMs to upgrade the RAM to as much as 64 MB. SIMMs are available in 4, 8, 16, and 32 MB sizes.

Additional printer memory (RAM) allows you to download more fonts and increase the printer's buffer (area where data sent from the computer is stored while it's waiting to be printed).

Installing a SIMM

✹ **WARNING!** *Turn off the printer and unplug the power cord before taking the cover off the printer.*

ACHTUNG! *Bitte schalten Sie den Drucker aus und ziehen Sie den Netzstecker heraus bevor Sie die Druckerabdeckung öffnen.*

▲ **Caution**: *It's very important to protect the printer controller board and SIMMs from electrostatic damage while performing this task. Review the anti-static guidelines in the "Removing the Printer and Controller Board Covers" section, earlier in this chapter. Handle SIMMs carefully, preferably only by the edges.*

SIMMs are installed as follows:

1   **Access the printer controller board.**

    Use the instructions in the "Removing Printer and Controller Board Covers" section of this chapter.

2   **Position the controller board so the interface panel is on your right.**

3   **Remove the SIMM from the anti-static bag.**

4   Insert the SIMM into the SIMM connector.

Hold the SIMM at a 45° angle to the controller board, with the notch on the right side. Slide the SIMM into either SIMM connector, and then push gently on it to make sure it is securely seated in the connector.

»   **Note:** *You can insert a SIMM in either SIMM connector as long as DRAMØ, the SIMM connector closest to you, is occupied. "DRAMØ" is marked on the controller board for ease of identification.*
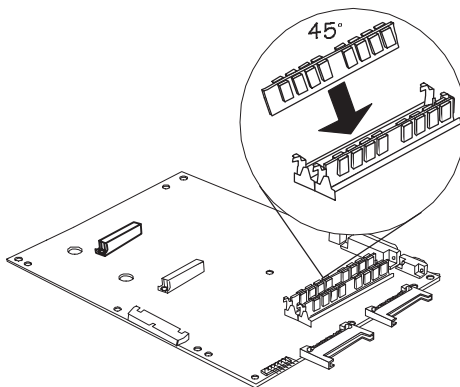
5   **Tilt the SIMM forward to a 90° angle until you feel it snap into place.**

When seated, the SIMM stands upright, firmly in place. If you cannot snap the SIMM into place, do not force it. Reposition it, making sure that the bottom of the SIMM is seated completely in the connector.
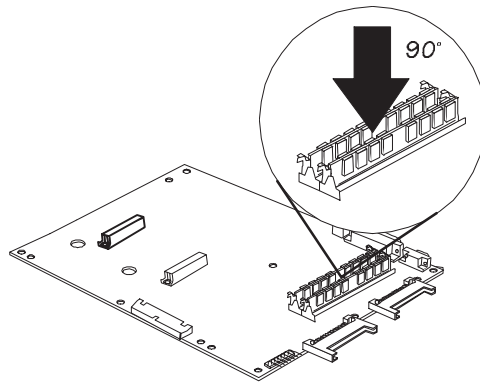
6   **Repeat steps 3-5 for each additional SIMM being installing.**

7   **Replace the printer and controller board covers.**

Use the instructions in the "Replacing the Printer and Controller Board Covers" section of this chapter.

Removing a SIMM

If both of the SIMM connectors are filled and you want to install more memory (for example, if you want to replace a 4 MB SIMM with an 8 MB SIMM), one or more SIMMs must be removed before a larger SIMM can be installed. Then refer to the previous section, "Installing a SIMM," for installation instructions. A SIMM can be removed from and installed in either SIMM connector as long as DRAMØ, the SIMM connector closest to you, is occupied. Also, you must make sure that there is a total of at least 12 MB of RAM installed.

☀ **WARNING!** *Turn off the printer and unplug the power cord before taking the cover off the printer.*

ACHTUNG! *Bitte schalten Sie den Drucker aus und ziehen Sie den Netzstecker heraus bevor Sie die Druckerabdeckung öffnen.*

▲ *Caution: It's very important to protect the printer controller board and SIMMs from electrostatic damage while performing this task. Review the anti-static guidelines in the "Removing the Printer and Controller Board Covers" section, earlier in this chapter. Handle SIMMs carefully, preferably only by the edges.*

Remove a SIMM as follows:

1   Access the printer controller board.

Use the instructions in the "Removing the Printer and Controller Board Covers" section of this chapter.

2   Position the controller board so the interface panel is on your right.

3   Release the SIMM.

Pull the latches on each side of the SIMM connector outward using both thumbs.

4   Remove the SIMM.

Tilt the SIMM backward to a 45° angle away from the SIMM con-
nector, and then lift it out.
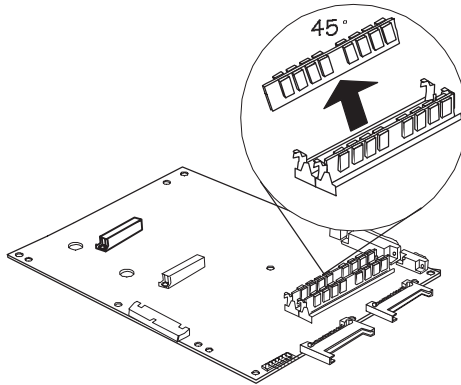
5   If necessary, refer to "Installing a SIMM," earlier in this section.

6   Replace the printer and controller board covers.

Use the instructions in the "Replacing the Printer and Controller
Board Covers" section of this chapter.

Intellifont Proms

The optional Intellifont proms increase the number of fonts available to the HP PCL 5 emulation on your printer from 20 to the 37 PCL 5 fonts available on a Hewlett-Packard LaserJet 4Si.

Intellifont Kit

Your Intellifont kit contains the following items:

- These instructions
- One anti-static wristband
- Four PROMs

If anything is missing, call your QMS vendor.

Installing the Intellifont Proms

☸ **WARNING!** *Turn off the printer and unplug the power cord before taking the cover off the printer.*

ACHTUNG! *Bitte schalten Sie den Drucker aus und ziehen Sie den Netzstecker heraus bevor Sie die Druckerabdeckung öffnen.*

▲ **Caution**: *It's very important to protect the printer controller board from electrostatic damage while performing this task.*

***If an anti-static wrist strap is provided** in your printer option kit, attach one end of it to your wrist and the other end to any convenient electrical ground (for example, the bare metal chassis of equipment, as on the back of a computer, that is plugged in but turned off). Never attach the wrist strap to any piece of equipment with an electrical current present. Turn off all power switches first. Plastic, rubber, wood, painted metal surfaces, and telephones are not acceptable grounding points. The printer isn't an acceptable grounding point either because it must be unplugged before you perform this task.*

If you don't have an anti-static wrist strap, *discharge your body's static electric charge by touching a grounded surface before you handle any printer boards or components and before removing the controller board cover. Redischarge your body's static electric charge each time after walking around and before touching the printer controller board again.*

1   Access the printer controller board.

Use the instructions in the "Removing Printer and Controller Board Covers" section of this chapter.

2   Position the controller board so the interface panel is on your right.

3   Locate the appropriate PROM sockets.

The sockets in which the Intellifont PROMs will be installed are MR40, MR41, MR42, and MR43.
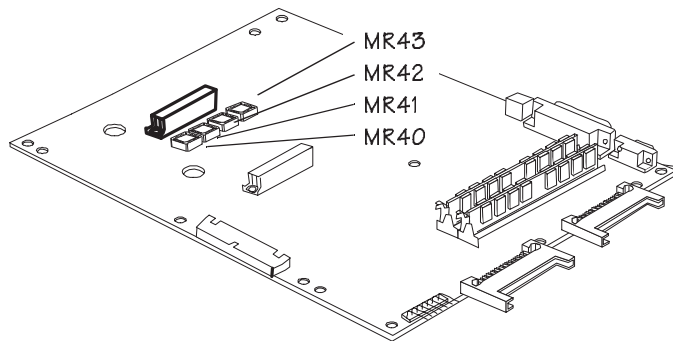
4   Gently work each PROM into its socket.

Because of the difficulty in removing a PROM once it is installed, it is important that you read the following information carefully before you begin inserting the PROMs.

■ The numbers of the Intellifont PROMs (MR40, MR41, MR42, and MR43) correspond to the socket numbers printed on the controller board.

■ Both the PROMs and their sockets are notched on one corner to identify correct orientation: notch to notch.

Socket   PROM
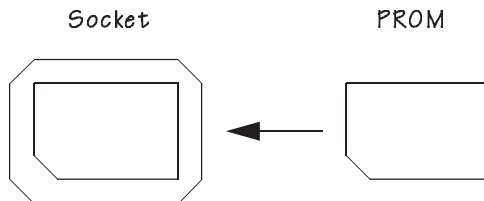
■ If you meet resistance when inserting a PROM in its socket, recheck the orientation of the PROM.

▲ **Caution**: *Do not force the PROMs into the sockets.*

5 **Check your PROM installation.**

Make that each PROM is in the correct socket and that the notched ends of the PROMs match the notched ends of the sockets.

6 **Replace the printer and controller board covers.**

Use the instructions in the "Replacing the Printer and Controller Board Covers" section of this chapter.

Increasing the Disk Cache Size

If your printer has more than 12 MB of RAM, the size of the disk cache is adequate.

If your printer has 12 MB of RAM, you must do one of the following to use the Intellifont fonts:

■ Add 48 KB to the disk cache (Administration/Memory/Disk Cache menu).

» **Note:** *You may need to decrease one of the other memory clients before increasing the disk cache client.*

■ Enable disk swapping (Administration/Memory/Enable Disk Swap menu) if a hard disk is available–this automatically increases the size of the disk cache to 256 KB.

■ Add more printer memory, which automatically increases the size of the disk cache. See "Single In-Line Memory Modules," earlier in this chapter.

Verifying the Installation

Once you have installed the Intellifont proms, print a start-up page and an advanced status page to verify the installation.

1   Wait for the printer message window to display `IDLE`.

2   If necessary, use the Administration/Startup Options/Startup Page menu to enable start-up pages.

3   Turn the printer off and back on again.

In the Options section of the start-up page, the items `%car-tridge%` and `%cartridge1%` verify the installation of the SIMM. (Both items appear even though you've installed only a single option.)

4   If necessary, use the Administration/Special Pages/Status Page Type menu to change the default Standard setting to Advanced.

5   Press the Status Page key to print an advanced status page.

The list of HP PCL fonts includes all of the new Intellifont fonts. Keep this status page for reference when accessing these fonts.

Font List

The following 37 fonts are now available for use. They can be auto-matically rotated to landscape orientation. All fonts are scalable and available in 35 symbol sets unless otherwise noted.

Font	Pi/ Symbol	Sans Serif	Script	Serif
Albertus Semi Bold Albertus Extra Bold		✓ ✓		
Antique Olive Medium Antique Olive Italic Medium Antique Olive Bold		✓ ✓ ✓		
Clarendon Condensed Bold				✓
Coronet Italic Medium			✓	
Courier Medium Courier Italic Medium Courier Bold Courier Italic Bold				✓ ✓ ✓ ✓
Garamond (Stempel) Medium Garamond (Stempel) Italic Medium Garamond (Stempel) Bold Garamond (Stempel) Italic Bold				✓ ✓ ✓ ✓
ITC Zapf Dingbats (1 symbol set)	✓			
Letter Gothic Medium Letter Gothic Italic Medium Letter Gothic Bold		✓ ✓ ✓		
Line Printer (16.66 pitch, 8.5 points, 25 symbol sets)		✓		
Coronet Italic Medium			✓	
Omega Medium Omega Italic Medium Omega Bold Omega Italic Bold		✓ ✓ ✓ ✓		

Font	Pi/ Symbol	Sans Serif	Script	Serif
Times Roman Medium Times Roman Italic Medium Times Roman Bold Times Roman Italic Bold				✓ ✓ ✓ ✓
Univers Medium Univers Italic Medium Univers Bold Univers Italic Bold		✓ ✓ ✓ ✓		
Univers Condensed Medium Univers Condensed Italic Medium Univers Condensed Bold Univers Condensed Italic Bold		✓ ✓ ✓ ✓		

Accessing the Fonts

Using Your PCL Application

Use your PCL application to set the font for a single document. See your application documentation for information.

Using the Printer Configuration Menu

Use the printer configuration menu to set the default font for all PCL documents.

» **Note:** *Before beginning this procedure, you must have a PCL 5 font list from the advanced status page. See steps 4 and 5 of the "Verify the Installation" section, above, for information on printing an advanced status page.*

1   **Access the Administation/PCL5/Default Font menu.**

2   **Choose the Select by Index option.**

3   **Access the Administration/PCL5/Default Font Idx menu.**

4   **Identify the appropriate font selection index.**

The font selection indexes are listed in the PCL 5 font list on the advanced status page.

5   Save your changes and put the printer back on line.

Optional Network Interfaces

In addition to the three standard interfaces—parallel, serial, and AppleTalk—the QMS 1660 Print System has the option of using two Ethernet and/or NetWare network interfaces. These additional interfaces allow greater flexibility when working in a complex network environment.

An optional network interface may be installed in either of the two optional I/O openings on the back of the printer. These openings are to the right of the other interface ports and are covered with a rectangular metal plate.
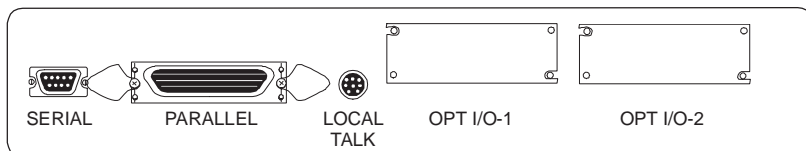
The printer's simultaneous interface operation (SIO) allows the optional network interfaces to be active at the same time as the other ports. In other words, your printer can communicate through up to five ports with five host computers or computer networks. One host can interface through the parallel port, one through the serial port, one through the AppleTalk port, and two through the optional interface ports. See your QMS vendor for a list of optional network interfaces available.

Optional Network Interface Assembly Kit

The optional network interface assembly kit includes the following:

- An interface card

- A plastic standoff

- Interface documentation (for CrownNet network interface cards)

- Interface software (for CrownNet network interface cards)

The kit may also include additional parts not required for network interface installation on this printer.

Installing an Optional Network Interface

☀ **WARNING!** *Turn off the printer and unplug the power cord before taking the cover off the printer.*

ACHTUNG! *Bitte schalten Sie den Drucker aus und ziehen Sie den Netzstecker heraus bevor Sie die Druckerabdeckung öffnen.*

▲ **Caution**: *It's very important to protect the printer controller board from electrostatic damage while performing this task.*

*If an anti-static wrist strap is provided in your printer option kit, attach one end of it to your wrist and the other end to any convenient electrical ground (for example, the bare metal chassis of equipment, as on the back of a computer, that is plugged in but **turned off)**. Never attach the wrist strap to any piece of equipment with an electrical current present. Turn off all power switches first. Plastic, rubber, wood, painted metal surfaces, and telephones are not acceptable grounding points. The printer isn't an acceptable grounding point either because it must be unplugged before you perform this task.*

If you don't have an anti-static wrist strap, discharge your body's static electric charge by touching a grounded surface before you handle any printer boards or components and before removing the controller board cover. Redischarge your body's static electric charge

*each time after walking around and before touching the printer con-
troller board again.*

1   **Turn off the printer, and then disconnect the power cord and
     all interface cables (parallel, serial, and AppleTalk) from the
     printer.**

2   **Access the printer controller board.**

     Use the instructions in the "Removing the Printer and Controller
     Board Covers" section of this chapter.

3   **Remove the two screws from one of the optional interface
     plates on the back of the printer.**

     You can use either of the optional interface ports.

     Save the two screws. (You'll use them when you install the NIC.)
     You can either save or discard the plate.
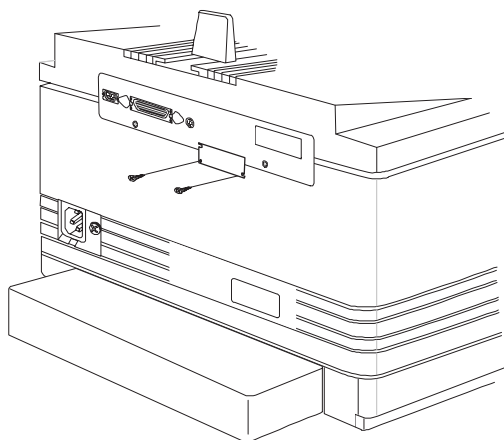
4   Attach the NIC.

a   Position the NIC so the port slides into the opening you just created.

b   Snap the plastic standoff onto the controller board.

c   Snap the NIC onto the 80-pin connector and the plastic standoff, both on the controller board.

It's okay to push down gently with your thumb positioned on the NIC right over the connector.
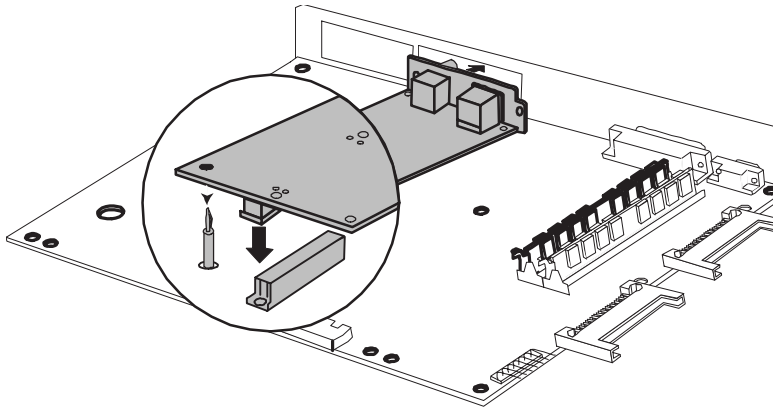
5   Secure the NIC to the printer with the screws you removed earlier.

6   Replace the controller board and printer covers.

Use the instructions in the "Replacing the Printer and Controller Board Covers" section of this chapter.

7   Reconnect all interface cables and the power cord, and then turn on the printer.

Using an Optional Network Interface

Once an optional network interface is installed, refer to the following for more information:

■ Chapter 4, "Printer Configuration," of this manual contains information about the PS Protocol option in the new optional network interface menu that appears in the Administration/ Communications menu. Chapter 5, "Additional Technical Information," contains a full discussion of PS Protocol.

■ The documentation that comes with the optional network inter- face contains information about all other options in the new net- work interface menu as well as instructions for connecting the printer to the network and for printing over the network.

■ Your application and network documentation contain information on printing over the network.

Storage Options

Hard disks provide true virtual memory as well as storage for charac- ter bitmaps, downloaded outline fonts, and other files.

IDE-SCSI Board

An optional internal IDE-SCSI (Integrated Drive Electronics-Small Computer System Interface) board supports an internal IDE hard disk and up to three external SCSI hard disks. The board is installed in one of the OPT/IO openings onthe back of the printer.

A board may be installed in either, but not both, of the two optional I/O openings on the back of the printer. These openings are to the right of

the interface ports and are each covered with a rectangular metal
plate.
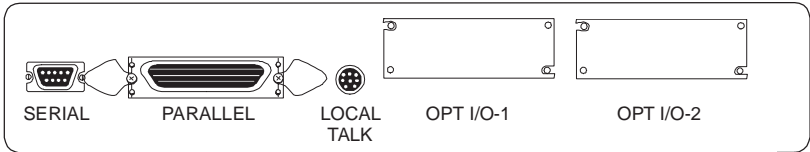
» **Note:** *Hard disk specifications are included in Q-FAX document 6502,
"QMS-tested SIMMs and Hard Disks." This document contains a
description of each approved hard disk, its manufacturers and part
numbers, and the QMS products on which it can be used. See
appendix A, "QMS Customer Support," of this manual to find out how
to access Q-FAX documents.*

Installing an IDE-SCSI Board

✹ **WARNING!** *Turn off the printer and unplug the power cord before
taking the cover off the printer.*

ACHTUNG! *Bitte schalten Sie den Drucker aus und ziehen Sie den
Netzstecker heraus bevor Sie die Druckerabdeckung öffnen.*

▲ **Caution**: *It's very important to protect the printer controller board from electrostatic damage while performing this task.*

If an anti-static wrist strap is provided in your printer option kit, attach one end of it to your wrist and the other end to any convenient electrical ground (for example, the bare metal chassis of equipment, as on the back of a computer, that is plugged in but turned off). Never attach the wrist strap to any piece of equipment with an electrical current present. Turn off all power switches first. Plastic, rubber, wood, painted metal surfaces, and telephones are not acceptable grounding points. The printer isn't an acceptable grounding point either because it must be unplugged before you perform this task.

If you don't have an anti-static wrist strap, discharge your body's static electric charge by touching a grounded surface before you handle any printer boards or components and before removing the controller board cover. Redischarge your body's static electric charge each time after walking around and before touching the printer controller board again.

1   **Turn off the printer, and then disconnect the power cord and all interface cables (parallel, serial, and AppleTalk) from the printer.**

2   **Access the printer controller board.**

Use the instructions in the "Removing the Printer and Controller Board Covers" section of this chapter.

**3   Remove the two screws from one of the optional interface
plates on the back of the printer.**

You can use either of the optional interface ports.

Save the two screws. (You'll use them when you install the
board.) You can either save or discard the plate.
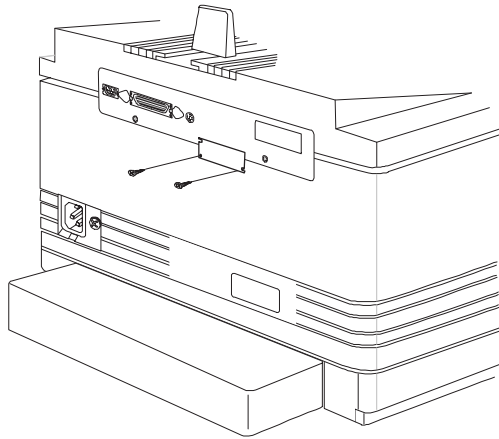
**4   If you are installing an internal hard disk at this time, use the
instructions in the following section, "Installing an Internal
Hard Disk," and then return to step 5.**

5   Attach the IDE-SCSI board.

a   Position the board so the port slides into the opening you just created.

b   Snap the plastic standoff onto the controller board.

c   Snap the board onto the 80-pin connector and the plastic standoff, both on the controller board.

It's okay to push down gently with your thumb positioned on the board right over the connector.
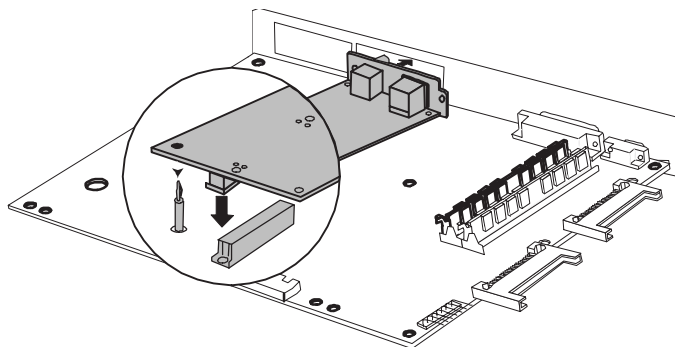
»   **Note:** *This illustration shows an IDE-SCSI board with an internal IDE hard disk installed.*

6   Secure the IDE-SCSI board to the rear interface panel with the screws you removed in step 3.

7   Replace the controller board and printer covers.

Use the instructions in the "Replacing the Printer and Controller Board Covers" section of this chapter.

8   If necessary, connect the external SCSI hard disk(s) to the new SCSI interface port on the interface panel.

An adapter cable may be necessary to connect the hard disk to the DB-25 connector on the board. Your QMS vendor should be able to provide you with this adapter cable. "External SCSI Hard

Disks," later in this section, contains more information on external hard disks.

9   **Reconnect all interface cables and the power cord, turn on any external hard disks, and then turn on the printer.**

»   **Note:** *For the printer to recognize external hard disks, each hard disk must be turned on before you turn on the printer.*

10 **If you've just installed a new hard disk—but not a Kanji hard disk—format it.**

Use the instructions given later in this section.

▲   **Caution**: *DO NOT under any circumstances format a Kanji hard disk—it is pre-formatted at the factory with QMS Kanji fonts. Reformatting this disk erases all data, fonts, and files.*

If a Kanji hard disk is reformatted or if data is modified so that it can't be recognized by the printer, you must return the disk to QMS for servicing. This is not covered by your warranty.

11 **Ensure that the printer recognizes the disk(s).**

If the printer recognizes the disk(s)

■   `DISK ONLINE` prints on the printer start-up page (if it's enabled).

■   `DISK ONLINE` prints on the standard status page or on the first page of the advance status page.

If the printer doesn't recognize the disk(s), see chapter 6, "Troubleshooting," in the *Operation* manual.

Removing an IDE-SCSI Board

Use the following instructions if you ever need to remove an IDE-SCSI board from the printer (for example, if you decide to install an optional IDE internal hard disk after the IDE-SCSI board is already installed).

Illustrations are not included with this procedure. However, you can use the appropriate illustrations in the previous section, "Installing an IDE-SCSI Board."

✹ **WARNING!** *Turn off the printer and unplug the power cord before taking the cover off the printer.*

ACHTUNG! *Bitte schalten Sie den Drucker aus und ziehen Sie den Netzstecker heraus bevor Sie die Druckerabdeckung öffnen.*

▲ **Caution**: *It's very important to protect the printer controller board from electrostatic damage while performing this task.*

If an anti-static wrist strap is provided in your printer option kit, attach one end of it to your wrist and the other end to any convenient electrical ground (for example, the bare metal chassis of equipment, as on the back of a computer, that is plugged in but turned off). Never attach the wrist strap to any piece of equipment with an electrical current present. Turn off all power switches first. Plastic, rubber, wood, painted metal surfaces, and telephones are not acceptable grounding points. The printer isn't an acceptable grounding point either because it must be unplugged before you perform this task.

If you don't have an anti-static wrist strap, discharge your body's static electric charge by touching a grounded surface before you handle any printer boards or components and before removing the controller board cover. Redischarge your body's static electric charge each time after walking around and before touching the printer controller board again.

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1 **Turn off the printer, and then disconnect the power cord and all interface cables (parallel, serial, AppleTalk, and optional) and SCSI hard disk cables, if any, from the printer.**

2 **Access the printer controller board.**

Use the instructions in the "Removing the Printer and Controller Board Covers" section of this chapter.

---

3   **Remove the screws securing the IDE-SCSI board to the rear
     interface panel of the printer.**

     Save the screws. (You'll use them when you reinstall the board.)

4   **Remove the IDE-SCSI board from the plastic standoff and the
     80-pin connector on the controller board.**

     To unlock the standoff, squeeze the tip between two fingers until
     you can easily remove the board.

5   **Install the internal hard disk.**

     ■   If you're installing an internal hard disk for the first time, use
          the instructions in a following section, "Installing an Internal
          Hard Disk."

     ■   If you're removing an internal hard disk at this time (for exam-
          ple, if you are removing an IDE hard disk to install a Kanji IDE
          hard disk), use the instructions in a following section,
          "Removing an Internal Hard Disk," and then use the instruc-
          tions in the "Installing an Internal Hard Disk" section.

Internal IDE Hard Disk

The internal IDE hard disk is identified by the hard disk device num-
ber DSK7.

IDE Hard Disk Assembly Kit

The IDE hard disk assembly kit includes the following:

■   IDE hard disk

■   Plastic ribbon cable

■   4 screws

Installing an Internal IDE Hard Disk

Only one internal IDE hard disk is supported. However, you can add
up to three external SCSI hard disks to the printer.

» **Note:** *Before installing an internal IDE hard disk, you must have an optional IDE-SCSI board.*

If you're installing an optional IDE-SCSI board for the first time*, refer now to "IDE-SCSI Board," earlier in this section, for installation instructions. You will be referred to these instructions at the appropriate time.*

If the IDE-SCSI board is already installed*, you must remove it before you can install an internal hard disk. Refer to the same section for information on removing the board.*

1   Connect one end of the plastic ribbon cable to the hard disk.

Align the colored stripe on the cable with pin 1 on the hard disk connector, and then slowly push the cable onto the connector.

▲   **Caution**: *The plastic ribbon cable is fragile. Handle it gently.*
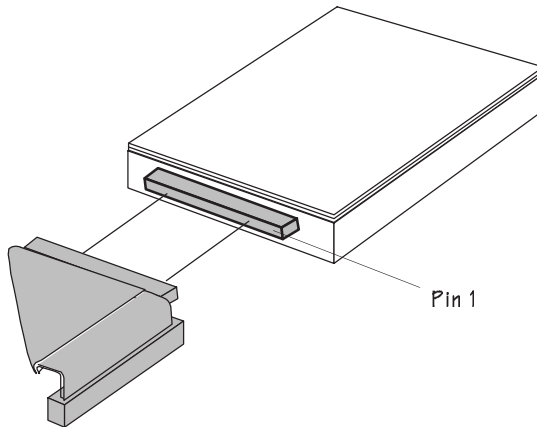
Pin 1

2 Connect the other end of the cable to the IDE-SCSI board.

Align the colored stripe on the cable with pin 1 on the IDE-SCSI board connector, and then slowly push the cable onto the connector.

Notice that the cable is folded so the blue stripe aligns easily with pin 1 on the connector.

▲ **Caution**: *The plastic ribbon cable is fragile. Handle it gently. Do not pull on it or push down hard on it.*

Pin 1
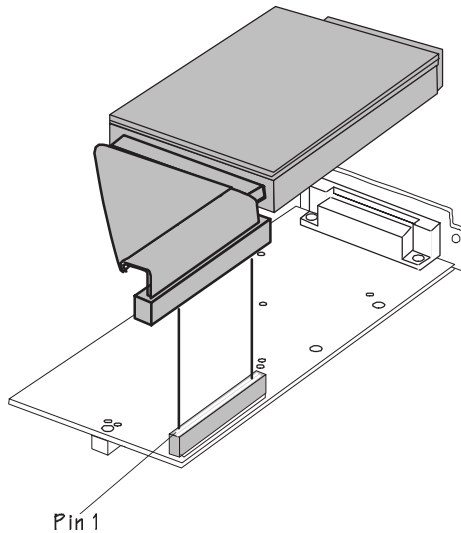
3   Attach the hard disk to the IDE-SCSI board.

Align the hard disk with the 2.5" hard disk outline on the IDE-SCSI board. The screw holes in the bottom of the hard disk should match up with the holes in the board.

Fasten the hard disk to the board with the four screws provided in the kit.
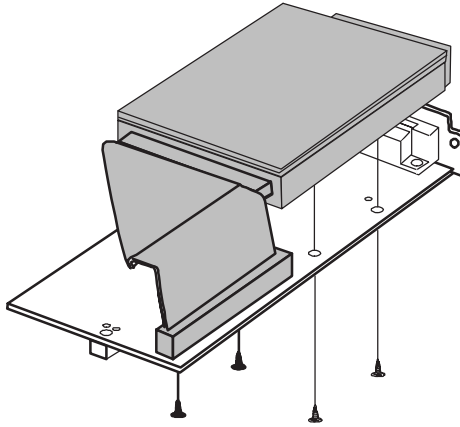
4   Return to "Installing an IDE-SCSI Board," earlier in this chapter.

Removing an Internal IDE Hard Disk

Use the following instructions if you need to remove an internal IDE hard disk (for example, if you have an IDE hard disk and you need to remove it to install a Kanji IDE hard disk).

Illustrations are not included with this procedure. However, you can use the appropriate illustrations in the previous section, "Installing an Internal IDE Hard Disk."

1   Refer to a previous section, "Removing an IDE-SCSI Board," for instructions on accessing the IDE-SCSI board.

You will be returned to this procedure at the appropriate point.

2   **Remove the hard disk from the IDE-SCSI board.**

Four screws connect the hard disk to the board.

3   **Disconnect the plastic ribbon cable from the IDE-SCSI board.**

▲   **Caution**: *The plastic ribbon cable is fragile. Handle it gently. Do not pull on it.*

4   **Disconnect the other end of the plastic ribbon cable from the hard disk.**

▲   **Caution**: *The plastic ribbon cable is fragile. Handle it gently. Do not pull on it.*

5   **If you're installing another internal hard disk, refer to the instructions in the previous section, "Installing an Internal IDE hard disk."**

External SCSI Hard Disks

The documentation that comes with your external SCSI (Small Computer System Interface) hard disk should contain all of the necessary information for connecting and configuring the disk.

Identifying Hard Disks

Hard disks are identified by device numbers which you assign. Valid choices for external SCSI hard disks range from DSK0 to DSK6. However, you cannot repeat numbers; each device number must be unique.The internal IDE hard disk is DSK7.
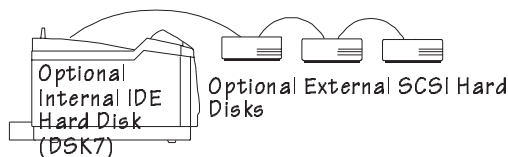
▲ **Caution**: *If you connect to this printer an external hard disk you previously used with an earlier QMS Crown printer (such as a QMS 860, 860 Plus, 1700, 1725, 1725SLS, 2000, 2025, 3200, 3225, 3825, 4525, ColorScript 210/230, Laser 1000, or magicolor Laser Printer), this QMS 1660 software release will automatically reorganize the files on the hard disk when the printer is turned back on again. Once this reorganization is done, the files on the hard disk can no longer be accessed if the hard disk is attached to an earlier QMS Crown printer again.*

This reorganization process takes time. If, when you first turn the printer on after attaching a previously used hard disk, it does not come on line immediately, be patient. Interrupting the reorganization process could cause all files on the hard disk to be lost.

Turning on an External Hard Disk

For the printer to recognize one or more external hard disks, each hard disk must be turned on before you turn on the printer.

If the printer recognizes the disk(s)

■ `DISK ONLINE` prints on the printer start-up page (if it's enabled).

■ `%%diskx%` (where *x* is 0-6 for any external SCSI hard disks, depending on the SCSI ID set on the back of the disk, and 7 for an internal IDE hard disk) prints on the start-up page (if it's enabled).

■ `DISK ONLINE` prints on the standard status page or on the first page of the advance status page.

The Disk Operations Menu

The Administration/Disk Operations menu contains all of the options you need to format a hard disk, as well as to install optional fonts on and remove them from a hard disk.

» **Note:** *The install, remove, and format disk operations do not include support for a Font Folio disk. You must download the fonts to your hard disk from host applications.*

Error Messages

The following three messages may appear while you are using the Disk Operations menu.

Message	Meaning	Action
FORMAT FAILED	The hard disk cannot be used.	Press the Menu key to remove the message, and contact your QMS vendor.
WRITE ERROR	The hard disk encountered a write error, or there is no room for the data on the hard disk or in RAM.	Press the Menu key to remove the message, and restart the operation from the beginning.

Formatting a Hard Disk

You have two ways of formatting a hard disk:

■ PS Executive Series Utilities

■ Printer configuration menu

▲ **Caution**: *DO NOT under any circumstances format a Kanji hard disk—it is pre-formatted at the factory with QMS Kanji fonts. Reformatting this disk erases all data, fonts, and files.*

If a Kanji hard disk is reformatted or if data is modified so that it can't be recognized by the printer, you must return the disk to QMS for servicing. This is not covered by your warranty.

Using PS Executive Series Utilities

The PS Executive Series Utilities offer formatting options for both Macintosh and PC setups. See the on-line documentation for details on formatting disks.

Using the Printer Configuration Menu

After you have accessed the Administration/Disk Operations menu, press the control panel keys in the order shown in the following table. The printer responds by displaying a status message in the message window.

» **Note:** *You may need to press the Next key one or more times to advance through the list of selections or options.*

Use this key. . .	to...	The message window reads...
Select	Access the Administration/Disk Operations/Format Disk menu.	`DISK OPERATIONS` `FORMAT DISK`
Select	Access the Format Disk/Dsk#: menu.	`FORMAT DISK` `DSK#:` *x*
Next	Scroll through the list of attached disks.	`FORMAT DISK` `DSK:` *x*
Select	Select the disk and display a format confirmation message.	`FORMAT DISK` `ARE YOU SURE?`
Select	Begin the formatting process. The hard disk is formatted while the system reboots.	`FORMAT DISK` `FORMATTING...`
	You are informed when the formatting process is complete. The printer then reboots, and a start-up page prints (if enabled).	`FORMAT DISK` `FORMAT COMPLETE`

» **Note:** *After an unformatted disk is formatted and the* `FORMAT COMPLETE` *message displays, you must turn the printer off and back on again before the printer can recognize the disk.*

Using a Hard Disk

Before you can use a formatted hard disk, you must increase the size of the disk cache. The way you do this depends on how much memory your printer has.

■ **If your printer has 12 MB of RAM**, enable disk swapping (Administration/Memory/Enable Disk Swap menu), which

automatically increases the disk cache size. See the "Memory" section in chapter 4, "Printer Configuration," for more information.

■ **If your printer has more than 12 MB of RAM**, increase the disk cache size (Administration/Memory/K Mem Disk Cache menu) to 256 KB. See the "Memory" section of chapter 4, "Printer Configuration," for more information.

After you have enabled disk swapping or increased the disk cache size, you must restart the printer and print a status page to ensure that the disk cache size has been increased. (Notice that VM remaining memory has also been automatically increased.)

Installing an Optional Font

Optional fonts can be installed in two ways:

■ You may use optional fonts by inserting the font card in one of the card slots below the printer's paper cassette. However, when you remove the font card from the card slot, you can no longer use those fonts. This procedure is covered in the "Using a Font Card" section found earlier in this chapter.

■ You can install (copy) the contents of a font card to a hard disk if one is available. The procedure that follows describes how to install the font card on your hard disk. Once the fonts are stored on the hard disk, they can be downloaded to the printer's memory when needed for printing.

▲ **Caution**: *If you install the contents of a font card to a hard disk, any optional fonts of the same type are overwritten. The original optional fonts must be downloaded again before you can access them. For example, optional PostScript fonts on the hard disk are overwritten by the PostScript fonts on a PostScript font card.*

Procedure

After you have accessed the Administration/Disk Operations menu, press the control panel keys in the order shown in the following table. The printer responds by displaying a status message in the message

window (DSK refers to the hard disk number, and CAR0 and CAR1 refer to the font card slot number).

» **Note:** *You may need to press the Next key one or more times to advance through the list of selections or options.*

Key	Purpose	Message
Select	Accesses the Administration/Disk Operations/Install Option menu.	`DISK OPERATIONS` `INSTALL OPTION`
Select	Accesses the Format Disk/Dsk#: menu.	`INSTALL OPTION` `DSK#:` *x*
Next	Scrolls through the list of attached disks.	`FORMAT DISK` `DSK:` *x*
Select	Selects the disk and accesses the card address from which the optional font is being installed.	`INSTALL SOURCE` `CAR#:` *x*
Select	Prompts you to insert the font card in one of the card slots below the printer's media cassette.	`INSTALL OPTION` `INSERT MEDIA`
	Begins reading data from the card and installing the appropriate files on the hard disk This usually takes several minutes.	`INSTALL OPTION` `READING DATA...`
	Acknowledges completion of the installation process.	`INSTALL OPTION` `INSTALL COMPLETE`
Menu	Exits from the Install Option menu and returns to the Disk Operations menu.	`DISK OPERATIONS` `INSTALL OPTION`

After the option is installed, remove the card from the slot and place the printer back on line.

Removing an Optional Font

Use the Administration/Disk Operations/Remove Option to remove optional fonts from your hard disk. You need the original font card containing the files. The Remove Option compares the contents of the card against the contents of the hard disk and then deletes the matching files from the hard disk.

Procedure

After you have accessed the Administration/Disk Operations menu, press the control panel keys in the order shown in the following table. The printer responds by displaying a status message in the message window (DSK refers to the hard disk number, and CAR0 and CAR1 refer to the font or card number).

» **Note:** *You may need to press the Next key one or more times to advance through the list of selections or options.*

Key	Purpose	Message
Select	Accesses the Administration/Disk Operations/Remove Option menu.	`DISK OPERATIONS` `REMOVE OPTION`
Select	Accesses the Remove Option/Dsk#: menu.	`REMOVE OPTION` `DSK#:` *x*
Next	Scrolls through the list of attached disks.	`REMOVE OPTION` `DSK:` *x*
Select	Selects the disk and accesses the card address from which removal information is being read.	`REMOVE SOURCE` `CAR#:` *x*
Select	Prompts you to insert the font card in one of the card slots below the printer's media cassette.	`REMOVE OPTION` `INSERT MEDIA`
	Begins reading data from the card and removing the appropriate fusiform the hard disk This usually takes several minutes.	`REMOVE OPTION` `READING DATA...`
	Acknowledges completion of the installation process.	`REMOVE OPTION` `REMOVE COMPLETE`
Menu	Exits from the Install Option menu nd returns to the Disk Operations menu.	`DISK OPERATIONS` `REMOVE OPTION`

After the option is removed, remove the card from the slot and place the printer back on line.

Downloading an Emulation

Optional emulations, such as LN03 and QUIC II, are available as PostScript files on PC floppy disks. This section describes how to

download an optional emulation from the floppy disk to the printer's hard disk.

» **Note:** *At least one hard disk (internal or external) must be installed on the printer before you can download an emulation. If more than one hard disk is available, the emulation automatically installs itself on the disk with the most free storage space.*

Once an emulation is downloaded, the only way to remove it is to reformat the hard disk (Administration/Disk Operations/Format Disk menu or PS Executive Series Utilities).

Procedure—PC Users

1 **If necessary connect the PC to the printer's parallel or serial port.**

2 **Turn on the printer, and wait for IDLE to appear in the message window.**

3 **Insert the emulation disk in your PC's 3.5" disk drive, and change to that drive (for example, if you're using the A drive, type a:↵).**

4 **Send the emulation to the printer's hard disk.**

   ■ If your PC and printer are connected through the parallel port, type

```
copy /b *.ps lpt#↵
```

   where # is 1 to 3. (/b refers to binary files.)

   ■ If your PC and printer are connected through the serial port, type

```
copy /b *.ps com#
```

   where # is 1 to 4. (/b refers to binary files.)

5 **When the downloading is complete, reboot the printer.**

The emulation is ready to be used.

Kanji Option Kit

The QMS Kanji Option Kit contains a pre-formatted IDE hard disk that contains Kanji fonts and other files. The Kanji fonts include Ryumin Light-KL and Gothic BBB-Medium (licensed to QMS by Morisawa and Company, Ltd.) as well as Mincho Medium, Mincho Heavy, Gothic Bold, and Gothic Heavy (licensed to QMS by TypeBank). These fonts can be printed at a variety of point sizes and in different styles and resolutions.

Three steps are involved in setting up and using the Kanji fonts:

- Install an optional IDE-SCSI board (if necessary) and the Kanji internal IDE hard disk

- Configure the printer for Kanji

- Access the Kanji fonts

Once you have performed these three steps, the six Kanji fonts are available for use just as if they were resident in the printer.

» **Note:** *Before beginning this procedure, have available the* QMS Crown Kanji Option Installation Instructions*, included in the Kanji Option Kit.*

Installing the IDE-SCSI Board and the Kanji Internal IDE Hard Disk

Use the instructions in the previous section, "Storage Options," to install the IDE-SCSI board and the Kanji internal IDE hard disk.

Keep the following considerations in mind:

- Ensure that your printer is already installed, configured, and tested for proper operation before installing the Kanji hard disk.

- If you already have an IDE-SCSI board installed in the printer, you do not need to purchase another board on which to install the Kanji hard disk.

  However, you do have to remove the IDE-SCSI board from the printer before you can install the hard disk. If you have an IDE

hard disk installed on the board, you must also remove that hard disk. Use the instructions in the previous section, "Storage Options."

Configuring the Printer

Due to the size of the Kanji two-byte font sets, you must reallocate the printer's memory for seven memory clients. The printer can't access the Kanji fonts until its memory is reconfigured. See the *QMS Crown Kanji Option Installation Instructions*, included in the Kanji Option Kit, for complete information. However, the following table provides an overview of the memory reallocation.

» **Note:** *To configure the memory clients as shown in the following table, you'll need either to take memory away from other memory clients not listed in the table or to add additional memory.*

Memory Client	Minimum Kanji Setting
K Mem for Spool	112
K Mem for PSHeap	3584
K Mem for PS Fonts	1000
K Mem Emulation	768
K Mem Emul Tmp	256
K Mem Display	512
K Mem Disk Cache	256

Accessing the Kanji Fonts

See the *QMS Crown Kanji Option Installation Instructions*, included in the Kanji Option Kit, for complete information on accessing the Kanji fonts from a Macintosh, from DOS, and from Windows.

Updating System Software

The system software in your QMS 1660 Print System is stored on 4 MB of flash memory that can be erased and rewritten to "in a flash." This allows you to update the system software without opening up the printer and installing new PROMs. Updated system software allows you to take advantage of future enhancements to the printer.

Updating the system software is a three-step procedure:

1   **Choose the appropriate compressed system software files.**

2   **Install the system software on your computer.**

3   **Download the system software to the printer.**

The following sections explain these steps in detail.

▲ **Caution:** *Some fonts stored on your printer's hard disk are copy-protected. Therefore, when you upgrade the system software (release 2.0 or later firmware) on your QMS 1660 Print System, these fonts must be downloaded again for the printer to recognize them. See your font documentation for downloading instructions.*

Choosing the Appropriate System Software Files for Downloading

System software is contained on 8 disks—4 PC and 4 Macintosh. The disks you use depend on whether your printer is functioning or not, the current firmware version, and how you plan to download the system software to the printer.

Computer*	Disk Set to Use	Hard Disk Space Needed (approx.)	Printer		Firmware Version**	Interfaces for Downloading
			Functional	Non-Functional		
Macintosh	SYSTEMLOADER	1.75 MB	√	√	1.x	Serial
	SYSTEMDL.PS	3.25 MB	√		2.x	All
PC	SYSTEM.DL	1.75 MB	√	√	1.x	Parallel, serial
	SYSTEMDL.PS	3.25 MB	√		2.x	All

* To download the system software from a UNIX system, you must first install the system softwae on a Macintosh or PC and then upload it to the UNIX system.

** The printer's firmware level is listed on both the start-up and status pages.

Installing the System Software

Once you have identified the appropriate print system software disk set (using the table in the previous section), you must install the software on your computer's hard disk before you can download it to the printer.

1   **Ensure that your computer has enough free hard disk space for the system software.**

2   **Create a new folder (Macintosh) or directory (PC) on your computer.**

3   **Insert Disk 1 of the appropriate print system software disk set in your computer's disk drive.**

4   **Install the files on your computer's hard disk.**

■ **Macintosh**

a   Open the Installer application.

   ■ **If you're using the SYSTEMDL.PS file** (see the
      table in the previous section), double-click the
      PRINTSYSTEM.INSTALLER file icon.

   ■ **If you're using the SYSTEM.DL file** (see the table
      in the previous section), double-click the SYSTEM-
      LOADER.1 icon.

b   In the dialog box that appears, change the Install
    Location to the folder you created in step 2. Use the drop-
    down list box to select Select Folder, in the Select the
    Installation Folder dialog box select the appropriate disk
    and folder, and then click Select.

c   Click Install to begin the installation.

d   When prompted, insert disk 2 of the system software.

    The installation takes approximately 1.5 minutes. The
    Installer places the appropriate system software file
    (either SYSTEMDL.PS or SYSTEMLOADER) in the
    folder you selected in step b.

e   When the installation is finished, you're prompted to click
    Quit to exit the Installer program.

■ **PC**

a   At the DOS C:*DIRECTORY* prompt, type `x:pkunzip`
    `x:system`↵ where *DIRECTORY* is the name of the new
    directory you created in step 2, and *x* is the name of the
    disk drive in which you inserted Disk 1.

b   Follow the prompts. They instruct you to insert the
    system software disks in the following order:

   ■   Last disk (system software disk 2)

   ■   Disk 1 (system software disk 1)

   ■   Disk 2 (system software disk 2)

■ **UNIX**

a Follow the instructions given above for either the Macintosh or the PC.

b After the system software file has been decompressed on hard disk of the Macintosh or the PC, upload the decompressed file to the UNIX system.

5 Download the system software to the printer.

The procedure for downloading system software depends on whether the print system software is functional (the printer starts up normally, and IDLE displays in the message window) or non-functional (the printer can't start up; the message window remains blank), and which system software file you decompressed in the previous step.

See one of the following sections for instructions:

■ "Downloading System Software to a Functional Printer— SYSTEMDL.PS"

■ "Downloading System Software to a Functional Printer— SYSTEM.DL"

■ "Downloading System Software to a Non-Functional Printer"

Downloading System Software to a Functional Printer—SYSTEMDL.PS

If the print system software is non-functional (the printer can't start up), go to a following section, "Downloading System Software to a Non-Functional Printer."

If the print system software is functional (the printer starts up normally, and IDLE displays in the message window), and if you decompressed the file SYSTEMDL.PS in the previous section, use these instructions.

Before You Begin Downloading the Software

■ Ensure that the system software is decompressed, as described in the previous section.

■ Turn on the printer, wait for `IDLE` to appear in the message window, and then print an advanced status page.

   This procedure may change the current configuration settings. The advanced status page provides a record of all current configuration settings, so you can verify them, and reconfigure them, if necessary, after the system software has been updated.

■ Ensure that the Administration/Communications/*Interface*/Emulation menu (where *Interface* is the interface you plan to use to download the system software), is set to ESP or PostScript.

■ Ensure that the printer is on line and idle.

Macintosh

1   In the Chooser, choose the printer to be upgraded.

2   Open PS Executive by double-clicking on the PS Exec icon.

3   From the File menu, choose Print PS File.

4   Click the Option button, make sure all options are disabled, and then click OK.

5   Select the SYSTEMDL.PS file, and choose Send.

   The downloading process takes about 5 minutes, depending on the size of the file and the speed of your computer. The printer's Ready indicator blinks as the new system image is copied to flash memory.

   After the updated system software has been written to flash memory, the printer reboots with the new system image, prints a start-up page, and returns to `IDLE`.

»   **Note:** *The new flash image does not erase the old image until the printer verifies that the new image is valid.*

6 Print another advanced status page, and verify that the con-figuration settings match the previous configuration settings (on the advanced status page printed in step 1).

7 If there are differences in the configuration settings, recon-figure them through the printer configuration menu.

8 On your computer's hard disk, delete the folder containing the SYSTEM.SEA and SYSTEM.SEA.2 files.

PC and UNIX

1 Download the new system software PostScript file SYS-TEMDL.PS to the printer, over any available interface, the way you would normally send a PostScript file.

For example, you might use PS Executive, **copy,** or **fstprn** from a PC, or **qpr** or **put** from a UNIX system.

The downloading process takes about 5 minutes, depending on the size of the file and the speed of your computer. The printer's Ready indicator blinks as the new system image is copied to flash memory.

After the updated system software has been written to flash memory, the printer reboots with the new system image, prints a start-up page, and returns to IDLE.

» **Note:** *The new flash image does not erase the old image until the printer verifies that the new image is valid.*

2 Print another advanced status page, and verify that the con-figuration settings match the previous configuration settings (on the advanced status page printed in step 1).

3 If there are differences in the configuration settings, recon-figure them through the printer configuration menu.

Downloading System Software to a Functional Printer—SYSTEM.DL

If the print system software is non-functional (the printer can't start up), go to the following section, "Downloading System Software to a Non-Functional Printer."

If the print system software is functional (the printer starts up normally, and IDLE displays in the message window), and if you decompressed the file SYSTEMLOADER (Macintosh) or SYSTEM.DL (PC) in the previous section, use these instructions.

» **Note:** *Before you can use these instructions, you must have decompressed the system software, as described in the previous section.*

Macintosh

» **Note:** *This downloading procedure requires a connection from the Macintosh's serial port (either the modem or the printer port) to the printer's serial port. The cable must have a DIN-8 female connector on the Macintosh end. It must also must be wired as a null modem or it must have a null modem adapter. The type of connector for the printer's serial port end of the cable depends on the type of null modem assembly. Your Macintosh vendor can provide you with this equipment, or you can use the "Cable Pinouts" section of appendix B, "Technical Specifications," if you want to make your own cable.*

1 **Connect the Macintosh to the printer's serial port.**

You can use either the printer or modem port on the Macintosh. However, the modem port provides the fastest download.

» **Note:** *To use the printer port you must first disable AppleTalk in the Chooser.*

2 **Turn on the printer, wait for IDLE to appear in the message window, and then print an advanced status page.**

This procedure should not change the current configuration settings. However, the advanced status page provides a record of all current configuration settings, so you can verify that they are the same after the system software has been updated.

3   **Take the printer off line.**

4   **Access the Administration/Miscellaneous/New Flash Image menu.**

5   **Select Yes in the New Flash Image menu.**

The printer waits for the new system software (image) to be sent from your Macintosh. (`YES` remains in the message window until the new image is sent.)

6   **Send the new system software image to the printer.**

a   At the Macintosh, double-click the SystemLoader icon.

b   In the dialog box that appears, make sure the correct download port is selected, and then choose the Send button to start the download.

The downloading process takes about 10 minutes, depending on the size of the file and the speed of your Macintosh. The Ready indicator blinks as the new system image is written to flash ROM. After the updated system software has been written to flash ROM, the message `Download Complete!` appears on the Macintosh screen, the printer reboots with the new system image, prints a start-up page, and returns to `IDLE`.

»   **Note:** *The new flash image does not erase the old image until the printer verifies that the new image is valid.*

7   **Print another advanced status page, and verify that the configuration settings match the previous configuration settings (on the advanced status page printed in step 2).**

8   **If there are differences, correct them through the printer configuration menu.**

9   **On your Macintosh hard disk, delete the folder containing the SYSTEMLOADER application.**

PC—Parallel Port

This is the recommended method for downloading from an IBM or compatible PC because it is the fastest method and because no additional cables or changes of port settings are necessary.

After you have decompressed the system software, as described in the previous section, use the following procedure to update the system software in flash memory.

» **Note:** *If you're using a serial port, skip to the following section, "PC— Serial Port."*

1   **Turn on the printer, wait for IDLE to appear in the message window, and then print an advanced status page.**

    This procedure should not change the current configuration settings. However, the advanced status page provides a record of all current configuration settings, so you can verify that they are the same after the system software has been updated.

2   **Take the printer off line.**

3   **Access the Administration/Miscellaneous/New Flash Image menu.**

4   **Select Yes in the New Flash Image menu.**

    The printer waits for the new system software (image) to be sent via your PC's parallel port. (YES remains in the message window until the new image is sent.)

5   **Send the new image to the printer.**

    Type

    ```
    copy /b system.dl lpt#↵
    ```

    where # is 1 to 3. (/b refers to binary files.) If you're not sure of the number of the parallel port, check your PC's documentation.

    The downloading process takes about 5 minutes, depending on the size of the file and the speed of your PC. The Ready indicator blinks as the new system image is copied to flash ROM. After the updated system software has been written to flash ROM, the

printer reboots with the new system image, prints a start-up page, and returns to `IDLE`.

» **Note:** *The new flash image does not erase the old image until the printer verifies that the new image is valid.*

6 **Print another advanced status page, and verify that the current configuration settings match the previous configuration settings (on the advanced status page printed in step 1).**

7 **If there are differences in the configuration settings, correct them through the printer configuration menu.**

PC—Serial Port

This method for downloading the system software from an IBM or compatible PC should be used only when a parallel port is not available because it's slower and because it requires a null modem cable (see the "Cable Pinouts" section of appendix B, "Technical Specifications," for more information) and special software to set the PC's serial port to 38400 baud (see step 2, below).

After you have decompressed the system software, as described in an earlier section, use the following procedure to update the system software in flash memory.

» **Note:** *If you're using a parallel port, refer to the previous section, "PC—Parallel Port."*

1 **Connect the PC to the printer's serial port, using a null modem cable.**

2 **Download the DOS ModeX program from the QMS Bulletin Board.**

Using your modem, dial in to the QMS Bulletin Board, as described in appendix A, "QMS Customer Support." After you access the QMS Main Library through the L (Library of Files) selection, do the following:

a Choose D (Download a File).

b Type `hibaud.exe↵`

c Exit from the Bulletin Board.

    d   Terminate the connection.

3   Type `hibaud↵` **to extract the ModeX files.**

4   Set the PC's baud rate to 38400 by typing

```
modex.exe↵
modex # 38400 n 8 1↵
```

where # is 1-4. See the MODEX.DOC file for more information on this program.

5   Turn on the printer, wait for `IDLE` to appear in the message window, and then print an advanced status page.

This procedure should not change the current configuration settings. However, the advanced status page provides a record of all current configuration settings, so you can verify that they are the same after the system software has been updated.

6   Take the printer off line.

7   Turn on the RTS and CTS hardware flow control settings.

    a   Access the Administration/Communications/Serial/Hdwe Flow Ctl menu.

    b   Set RTS to On.

    c   Set CTS to On.

    d   Press the Online/Offline key to be prompted to save your changes.

    e   Select Yes to Save Changes.

8   Access the Administration/Miscellaneous/New Flash Image menu.

9   Select Yes in the New Flash Image menu.

The printer waits for the new system software (image) to be sent via your PC's parallel port. (`YES` remains in the message window until the new image is sent.)

10 Send the new image to the printer.

Type

```
copy /b system.dl com#↵
```

where # is 1 to 4. (/b refers to binary files.) If you're not sure of the number of the serial port, check your PC's documentation.

The downloading process takes about 5 minutes, depending on the size of the file and the speed of your PC. The Ready indicator blinks as the new system image is copied to flash ROM. After the updated system software has been written to flash ROM, the printer reboots with the new system image, prints a start-up page, and returns to IDLE.

»   **Note:** *The new flash image does not erase the old image until the printer verifies that the new image is valid.*

11 Print another advanced status page, and verify that the current configuration settings match the previous configuration settings (on the advanced status page printed in step 5).

12 If there are differences in the configuration settings, correct them through the printer configuration menu.

Downloading System Software to a Non-Functional Printer

If the print system software is functional (the printer starts up normally, and IDLE displays in the message window), go to one of the previous sections, "Downloading System Software to a Functional Printer—SYSTEMDL.PS" or "Downloading System Software to a Functional Printer—SYSTEM.DL."

If the print system software is non-functional (the printer can't start up), use these instructions to download the system software.

»   **Note:** *Before you can use these instructions, you must have decompressed the system software, as described in the previous section.*

Macintosh

If the current print system software is not functioning, you must con-
nect your Macintosh to the printer's serial port to reinstall the system
software. The downloading procedure will not work over the LocalTalk
or CrownNet interface in this case.

» **Note:** *This downloading procedure requires a connection from the
Macintosh's serial port (either the modem or the printer port) to the
printer's serial port. The cable must have a DIN-8 female connector
on the Macintosh end. It must also must be wired as a null modem or
it must have a null modem adapter. The type of connector for the
printer's serial port end of the cable depends on the type of null
modem assembly. Your Macintosh vendor can provide you with this
equipment, or you can use the "Cable Pinouts" section of appendix B,
"Technical Specifications," if you want to make your own cable.*

1   **Connect the Macintosh to the printer's serial port.**

You can use either the printer or modem port on the Macintosh.
However, the modem port provides the fastest download.

» **Note:** *To use the printer port you must first disable AppleTalk in
the Chooser.*

2   **Turn on the printer.**

3   **When the control panel indicators stop flashing (the mes-
sage window will remain blank since the printer is non-func-
tional), send the new system software file SYSTEM.DL to the
printer.**

a   At the Macintosh, double-click the SystemLoader icon.

b   In the dialog box that appears, make sure the correct
download port is selected, and then choose the Send button
to start the download.

The downloading process takes about 10 minutes, depend-
ing on the size of the file and the speed of your Macintosh.
The Ready indicator blinks as the new system image is writ-
ten to flash ROM. After the updated system software has
been written to flash ROM, the message `Download Com-
plete!` appears on the Macintosh screen, the printer

reboots with the new system image, prints a start-up page, and returns to IDLE.

» **Note:** *The new flash image does not erase the old image until the printer verifies that the new image is valid.*

PC—Parallel Port

If the current print system software is not functioning, you must connect your PC to either the printer's parallel or serial port to reinstall the system software. The downloading procedure will not work over the CrownNet interface in this case.

Using the parallel port is the recommended method for downloading from a PC because the parallel port is faster than the serial port and because no additional cables or changes of port settings are necessary.

» **Note:** *If you're using a serial port, skip to the following section, "PC— Serial Port."*

1 **If necessary, connect the PC to the printer's parallel port.**

2 **Turn on the printer.**

3 **When the control panel indicators stop flashing (the message window will remain blank since the printer is non-functional), send the new system software file SYSTEM.DL to the printer.**

Type

```
copy /b system.dl lpt#↵
```

where # is 1 to 3. (/b refers to binary files.) If you're not sure of the number of the parallel port, check your PC's documentation.

The downloading process takes about 5 minutes, depending on the size of the file and the speed of your PC. The Ready indicator blinks as the new system image is copied to flash ROM. After the updated system software has been written to flash ROM, the

printer reboots with the new system image, prints a start-up page, and returns to `IDLE`.

» **Note:** *The new flash image does not erase the old image until the printer verifies that the new image is valid.*

PC—Serial Port

If the current print system software is not functioning, you must connect your PC to either the printer's parallel or serial port to reinstall the system software. The downloading procedure will not work over the CrownNet interface in this case.

This method for downloading the system software from a PC should be used only when a parallel port is not available because it's slower and because it requires a null modem cable (see the "Cable Pinouts" section of appendix B, "Technical Specifications," for more information) and special software to set the PC's serial port to 38400 baud (see step 2, below).

» **Note:** *If you're using a parallel port, refer to the previous section, "PC—Parallel Port."*

1   If necessary, connect the PC to the printer's serial port, using a null modem cable.

2   Download the DOS ModeX program from the QMS Bulletin Board.

Using your modem, dial in to the QMS Bulletin Board, as described in appendix A, "QMS Customer Support." After you access the QMS Main Library through the L (Library of Files) selection, do the following:

a   Choose D (Download a File).

b   Type `hibaud.exe`↵

c   Exit from the Bulletin Board.

d   Terminate the connection.

3   Type `hibaud`↵ to extract the ModeX files.

4 **Set the PC's baud rate to 38400 by typing**

```
modex.exe↵
modex # 38400 n 8 1↵
```

where # is 1-4. See the MODEX.DOC file for more information on this program.

5 **Turn on the printer.**

6 **When the control panel indicators stop flashing (the message window will remain blank since the printer is non-functional), send the new system software file SYSTEM.DL to the printer.**

Type

```
copy /b system.dl com#↵
```

where # is 1 to 4. (/b refers to binary files.) If you're not sure of the number of the serial port, check your PC's documentation.

The downloading process takes about 5 minutes, depending on the size of the file and the speed of your PC. The Ready indicator blinks as the new system image is copied to flash ROM. After the updated system software has been written to flash ROM, the printer reboots with the new system image, prints a start-up page, and returns to IDLE.

» **Note:** *The new flash image does not erase the old image until the printer verifies that the new image is valid.*

❖

A

QMS Customer Support

In This Appendix . . .

- Sources of customer support
- QMS world-wide offices

Sources of Support

Several sources of help and information are available, depending on the type of help you need:

Your QMS Vendor

Your local vendor (the one from whom you bought the printer) may be best equipped to help you. Your vendor has specially trained service technicians available to answer questions, and the equipment to analyze your printer problems.

Your Application Vendor

Often, "printing" problems have more to do with the application being used than with the printer. In this case, the application manufacturer is the best source of help.

Q-FAX

Q-FAX, a QMS information retrieval service, provides application notes, technical support notes on common printing problems, and information about printer specifications, options, accessories, consumables, and prices.

In the United States and Canada, call (800) 633-7213 to reach Q-FAX. In all other countries, call (334) 633-3850. Have your fax number handy when you call (or place the call from your fax machine's handset).

You can choose to have either a directory (a list of currently available documents on a particular topic) or a specific document sent to you. The first time you call, request the directory (press 2 on your phone or fax keypad when prompted). Then call back to request specific documents. You can order up to three documents per call.

The QMS Corporate Bulletin Board System

The QMS Corporate Bulletin Board System (BBS) contains technical support notes, application notes, drivers, patches, and utilities, and you may leave technical questions not requiring an immediate response on electronic mail for the Sysop (System Operator).

The bulletin board [(334) 633-3632] operates at 1200, 2400, 9600, and 14400 baud, 8 data bits, no parity, 1 stop bit, with XMODEM, YMODEM, and ZMODEM capabilities. Contact the QMS Customer Response Center (CRC) for more information about the bulletin board.

CompuServe

Through CompuServe, you ask general (non-technical) questions, share information with other users, and access printing information and programs. When you use CompuServe, type `go qmsprint↵` to go directly to the forum where QMS is located. The QMS library section contains application notes, printer drivers, utilities, technical information, and announcement files.

Internet

The QMS server provides access to technical reports, new product announcements, a trade show schedule, and other general information about QMS.

You can access the QMS server via any one of the many web viewers available to Internet users. If you don't have access to a web viewer, we recommend the NCSA Mosaic web viewer (Mosaic is at ftp.ncsa.uiuc.edu). The QMS home page is at http://www.qms.com/. The QMS ftp resource is ftp.qms.com.

QMS Customer Response Center (CRC)

The QMS Customer Response Center (CRC) is available M-F, 7:00 am-6:00 pm, Central Standard Time, at (334) 633-4500 (US). You can also fax questions to CTA at (334) 633-3716 (US). Please indicate whether you would like a faxed or a phoned reply.

If you call for assistance, have the following information ready so our technicians can help you more quickly:

■ Your phone number, fax number, and shipping address

■ A description of the problem

■ The printer model and serial number

■ The type of host computer you are using

■ The type and version of operating system you are using

■ The interface you are using, and, if serial, the protocol

■ The application and version you are using

■ The emulation you are using

■ Your printer firmware version (listed on the status and start-up pages)

QMS National Service

The following numbers are valid in the US. To contact QMS in other countries, see the list of world-wide offices in the following section.

(800) 762-8894	Call for service information and maintenance pricing for repair of all QMS printers and printers of various other manufacturers.
(800) 858-1597	On-Site Service and Depot Repair Information 7:00-7:00 pm, Central Standard Time
(334) 633-4300 (x2530)	Spare Parts Ordering and Information

QMS World-wide Offices

United States/ Latin America	QMS, Inc. One Magnum Pass Mobile, AL 36618 (334) 633-4300 Product Information: (800) 523-2696 OEM Information: (800) 631-2692 Consumables: (800) 777-7782 Fax: (334) 633-4866 E-mail: info@qms.com Latin America Fax: (334) 639-3347
Asia-Pacific	QMS Asia-Pacific Melbourne 61 (3) 899 5777 Sydney 61 (2) 901 3235 Tokyo (81) (3) 3437 4030
Canada	QMS Canada, Inc. 9630 Rte. Trans-Canadienne Saint-Laurent, Québec H4S 1V9 Telephones: (514) 333-5940, (800) 361-3392 Fax: (514) 333-5949 National Service: (800) 268-4969 National Service Fax: (905) 673-7676 Offices in Ottawa, Québec City, Toronto, and Vancouver
Europe, Middle East, Africa	Düsseldorf (49) 211/596 1333 London (44) 1 784 442255 Maarssen (31) 3465 51 333 Paris (33) (1) 4107 9393 Stockholm (46) (8) 725 5680

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B

Technical Specifications

In This Chapter . . .

- Print engine specifications
- Physical characteristics
- Controller specifications
- Electrical and environmental requirements
- Print media specifications
- Cable pinouts
- Printer options and consumables
- Warranty considerations

Print Engine Specifications

Engine	Canon LBP-P380
Duty Cycle (maximum)	35,000 pages per month
Print Method	Laser beam scanning and dry electrophotographic printing; fixing by heated rollers
Print Speed	Up to 16 pages per minute using letter or A4 paper loaded long edge Up to 9 pages per minute using 11"x17"/279.40x431.80 mm or A3 paper loaded short edge » Note: Actual print speed depends on the host application
Resolution	300x300 dpi 600x600 dpi (certain media sizes require more than 12 MB RAM) 1200x600 dpi (requires 24 MB RAM)
Toner	Microfine toner designed especially for high-resolution printers (EP-BII cartridge); dry, single component in user-replaceable cartridge
Toner Cartridge Life	7,500 pages at normal (5%) page coverage, letter/A4-size media Over 23,000 pages at 5% page coverage, letter/A4-size media, if printer is run entirely in Conserve Toner mode
Warm-Up Time	90 seconds at 115V/240V, 68° F (20° C) 120 seconds at 220V, 68° F (20° C)

Controller Specifications

Emulations	PostScript—Level 1 compatibility mode and Level 2
	HP PCL 5
	HP-GL 7475A/7550A
	Lineprinter
	Support for downloadable optional emulations
Fonts	39 resident PostScript fonts that can be scaled from 4 points upward and rotated to any angle in 1° increments; all typefaces have multilingual character sets
	7 resident bitmap HP PCL fonts in 25 symbol sets, 12 resident scalable HP PCL fonts in 35 symbol sets, and 1 resident scalable HP PCL font in 5 symbol sets, all of which can automatically be rotated to landscape orientation
	40 resident HP-GL symbol sets
	Support for Type 1 and Type 3 host-resident downloadable and printer-card-resident PostScript fonts
	Support for Type 42 (PostScript format) host-resident downloadable TrueType fonts
Interfaces	AppleTalk, Centronics/IEEE 1284 bidirectional parallel, and RS-422 serial interfaces
	Support for up to 2 optional network interfaces (Ethernet, or Token-Ring) or an optional IDE-SCSI hard disk board (to which you can connect an IDE internal hard disk and up to 3 external SCSI hard disks)
Memory	12 or 24 MB RAM standard, upgradable to 64 MB
	4 MB System Flash ROM
	2 MB Font Mask ROM
	SIMM connector for up to 16 MB optional fonts
Type	IDT 3081E RISC microprocessor operating at 33 MHz

Electrical Requirements

Frequency	50/60 Hz (± 2 Hz)
Power Requirements	110/120v 50/60 Hz (about 90-130 VAC) or 220/240v 50 Hz (about 200-260 VAC)
Power Consumption	1 KW 68° F (20° C)

Environmental Requirements

Noise Level	Idle; maximum 37 dB (A) Printing; maximum 49 dB (A)
Ozone Density	The printer emits less than 0.1 ppm maximum with a 100% duty cycle under 8 hours of continuous operation
Relative Humidity	Printing: 20-80% RH (non-condensing) Storage: 35-85% RH (non-condensing)
Temperature Range	Printing: 50-90° F (10-32.5° C) Storage: 32-95° F (0-35° C)
Atmospheric Pressure	570-760 mm Hg

Physical Characteristics

Dimensions	WxDxH 18.07" x 20.55" x 11.81" 459 mm x 590 mm x 300 mm The height increases by 3.15"/80 mm with an optional paper feeder; the height increases by 4.76"/121 mm with an optional paper feeder and cassette supporter
Weight	About 50 lbs (23 kg)

Print Media

Delivery	Face down; about 300 sheets of 20 lb (75 g/m^2) paper
Feed	**Paper cassette** About 250 sheets of 20 lb (80 g/m^2) paper About 750 sheets of 20 lb (80 g/m^2) paper with the optional paper feeder **Multipurpose tray** About 100 sheets of 20 lb (80 g/m^2) paper About 50 sheets of transparencies About 40 sheets of labels
Loading	Automatic from multipurpose tray or paper cassette
Sizes	(See the following table)
Types	Cut-sheet paper, transparencies, and labels. We do not recommend printing on envelopes or perforated paper (including 3-hole-punched paper). However, if envelopes are used, they must be fed through the multipurpose tray.

Weight	Paper (cassette): 17-24 lb (64-90 g/m^2) Paper (multipurpose tray): 17-24 lb (64-90 g/m^2) Transparencies (multipurpose tray): 17-34 lb (64-128 g/m^2) Labels (multipurpose tray): 17-34 lb (64-128 g/m^2)

Print Media Sizes

Media	Media Size		Imageable Area		Feed
	Inches	**Millimeters**	**Inches**	**Millimeters**	**Edge**
11x17 12x19	11.00x17.00 11.70x19.50	279.40x431.80 297.18x495.30	10.69x16.66 11.37x18.81	271.61x432.17 288.80x477.77	Short Short
A3 A4 A5 A6/Postcard	11.69x16.54 8.27x11.70 5.83x8.27 4.13x5.85	296.93x420.12 210.06x297.18 148.09x210.06 104.90x148.59	11.37x16.19 7.94x11.37 5.48x7.96 3.78x5.50	288.80x411.23 201.68x288.80 139.32x202.18 96.00x139.82	Short Long Long Short
B4 B5 B6	10.12x14.32 7.16x10.12 5.06x7.17	257.05x363.73 181.86x257.05 128.52x182.12	9.81x13.78 6.81x9.81 4.70x6.81	249.26x350.01 172.97x249.26 119.38x172.97	Short Long Short
Executive	7.25x10.50	184.15x266.70	6.94x10.16	176.44x258.06	Short
Full Ledger	11.70x17.40	297.18x441.96	11.41x16.81	289.81x426.97	Short
Legal Letter	8.50x14.00 8.50x11.00	215.90x355.60 215.90x279.40	8.19x13.66 8.19x10.69	208.03x346.96 208.03x271.61	Short Long
Universal	11.70x17.00	297.18x431.80	11.39x16.62	288.80x422.15	Short

Cable Pinouts

Centronics/IEEE 1284 Parallel

This table gives the pinouts for the printer end of the Centronics/IEEE 1284 parallel cable used to connect your printer to a computer.
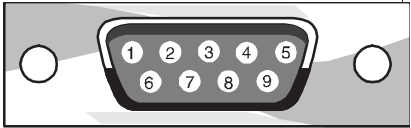
Signal Pin No.	Signal Description	Direction
1	Strobe-	In
2	Data 1	InOut
3	Data 2	InOut
4	Data 3	InOut
5	Data 4	InOut
6	Data 5	InOut
7	Data 6	InOut
8	Data 7	InOut
9	Data 8	InOut
10	Acnlg-	Out
11	Busy+	Out
12	Pe+	Out
13	Select	Out
14	Autofeed	In
15	Reserved	-
16	Ground	-
17	Ground	-
18	Vcc Test	-
19-30	Ground	-
31	Iprime	In
32	Fault-	Out
33	Reserved	-
34	Reserved	-
35	Reserved	-
36	Selectin	In

Notes to the Table

- ■ **Direction** refers to the direction of signal flow as viewed from the printer.

- ■ **Return** denotes "twisted-pair return" and is to be connected at signal-ground level. When wiring the interface, be sure to use a twisted-pair cable for each signal and never fail to complete connection on the return side. To prevent noise effectively, these cables should be shielded and connected to the chassis of the system unit and printer, respectively.

- ■ All interface conditions are based on Transistor-Transistor Logic (TTL) level. Both the rise and fall times of each signal must be less than 0.2 microseconds.

- ■ Data transfer must be carried out by recognizing the ACKNLG or BUSY signal.

- ■ The cable must have an overall braided shield, Belden 8345 or equivalent.

- ■ Connectors must have shielded housings. The overall shield must be bonded to the shielded housings at both ends of the cable.

RS-422 Serial

This table gives the correct pinouts for the 9-pin male RS-422 serial interface:

Pin	Name	Pinout View from Printer Interface
1	Not Used	
2	Receive Data (RXD)	
3	Transmit Data (TXD)	
4	Data Terminal Ready (DTR)	
5	Signal Ground (GND)	
6	Data Set Ready (DSR)	
7	Ready To Send (RTS)	
8	Clear To Send (CTS)	
9	Reserved	

IBM PC/XT, PC/AT, and Compatible Computers

The following diagrams show the serial **cable** pinouts for IBM PC/XT, PC/AT, and compatible computers.

» **Note:** *Not all serial cables are configured as shown and may require an additional null-modem adapter. Check with your cable vendor for compatibility.*

To Printer 9-Pin		To CPU XT 25-Pin Female		To Printer 9-Pin		To CPU AT 9-Pin Female
	1 Not Used				1 Not Used	
RXD 2		2 RXD		RXD 2		2 RXD
TXD 3		3 TXD		TXD 3		3 TXD
DTR 4		20 DTR		DTR 4		4 DTR
DSR 6		6 DSR		DSR 6		6 DSR
GND 5		7 GND		GND 5		5 GND
RTS 7		4 RTS		RTS 7		7 RTS
CTS 8		5 CTS		CTS 8		8 CTS
	9 Not Used				9 Not Used	
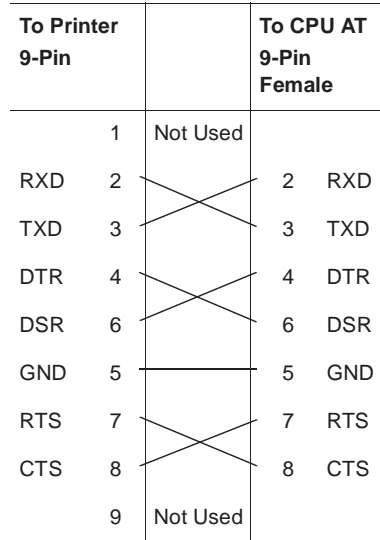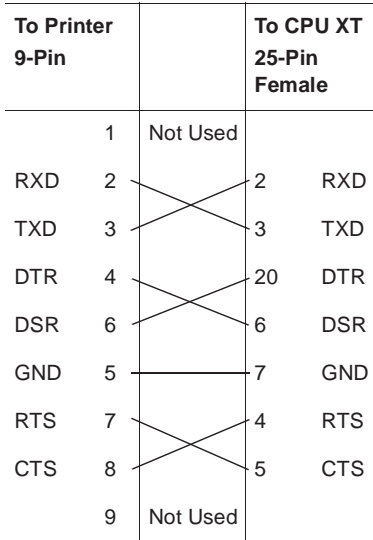
» **Note:** *To download printer system software via the serial port, your hardware must have RTS and CTS support. Make sure that pins 4 and 5 on the 25-pin serial cable and pins 7 and 8 on the 9-pin serial cable are criss-crossed as shown in this diagram.*

LocalTalk (Optional Interface)

The following table provides the pinouts for the printer's optional 8-pin LocalTalk interface:

Pin	Name	Pinout View from Printer Interface
1,2,7	Reserved	
3	Transmit Data - (TXD)	
4	Signal Ground (GND)	
5	Receive Data - (RXD)	
6	Transmit Data + (TXD)	
8	Receive Data + (RXD)	

Macintosh to Serial

The following table provides the pinouts for a cable connecting the Macintosh printer or modem port to the printer's serial port:

» **Note:** *To download printer system software from a Macintosh, you must have this type cable.*

To Macintosh DB-9 Female			To Printer DIN-8 Male
HandshakeOut	1	7	RTS
HandshakeIn	2	8	CTS
TXD-	3	3	TXD
RXD-	5	2	RXD
GND,RXD+	4,8*	5	GND
	6	Not Used	
	7	Not Used	

* Pins 4 and 8 must be connected together on the DIN-8 cable.

Printer Options

Hard Disks— Internal IDE, External SCSI	Specifications are included in Q-FAX document 6502, "QMS-tested SIMMs and Hard Disks." This document contains a description of each approved hard disk, its manufacturers and part numbers, and the QMS products on which it can be used. See appendix A, "QMS Customer Support," of this manual to find out how to access Q-FAX documents.
Paper Cassette Supporter	Allows installation of a 500-sheet paper cassette.
Paper Feeder	Allows installation of dual paper cassettes.
SIMMs	Specifications are included in Q-FAX document 6502, "QMS-tested SIMMs and Hard Disks." This document contains a description of each approved SIMM, its manufacturers and part numbers, and the QMS products on which it can be used. See appendix A, "QMS Customer Support," of this manual to find out how to access Q-FAX documents.

Consumable Supplies

	Size	Capacity
Cassettes	11" x 17"	250 sheet
	A3	250 sheets
	A4	250 sheets
	A4	500 sheets
	B4	250 sheets
	B5	250 sheets
	Legal	250 sheets
	Letter	250 sheets
	Letter	500 sheets
Media —Sizes	See "Print Media Sizes," earlier in this chapter.	

Media—Recommended Brands	Paper	**Plain**—Xerox 4024
		Laser—Hammermill Laser Print
	Labels	Avery 5260
	Transparencies	Canon brand type D 3-M type PP2500
Toner		EP-BII toner cartridge

Warranty Considerations

Various factors can affect a printer's warranty. Two important ones are consumables and electrostatic discharge. Read your printer warranty carefully, and then store it in a safe place.

Consumables and Your Warranty

The use of non-QMS consumables and/or accessories alone does not affect either your warranty or any maintenance contract you may have purchased. However, if QMS printer failure or damage is found to be directly attributable to the use of non-QMS consumables and/or accessories, QMS will not repair the printer free of charge. In this case, standard time and material charges will be applied to service your printer for that particular failure or damage. QMS recommends that you use only QMS consumables and accessories to support your printer. To order QMS consumables and accessories in the US, call (800) 777-7782. In all other countries, check appendix A, "QMS Customer Support," for the QMS office closest to you.

Electrostatic Discharge and Your Warranty

It's very important to protect the printer controller board and other printer circuit boards from electrostatic damage.

If an anti-static wrist strap is provided in your printer option kit, attach one end of it to your wrist and the other end to any convenient electrical ground. The bare metal chassis of equipment, such as on the back of a computer, is suitable if it is plugged in but **turned off**. Never attach the wrist strap to any piece of equipment with an electrical current present. Turn off all power switches first. Plastic, rubber, wood, painted metal surfaces, and telephones are not acceptable grounding points. The printer isn't an acceptable grounding point either because it must be unplugged before you perform this task.

If you don't have an anti-static wrist strap, discharge your body's static electric charge by touching a grounded surface before you handle any printer boards or components and before removing the controller board cover. If you must walk around before completing your task, discharge your body's static electric charge again before touching the printer controller board.

Incidental and consequential damages caused by not discharging electrostatic buildup can affect your printer warranty.

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Document Option Commands

In This Chapter . . .

■ Supported Document Option Commands (DOC)

Introduction

This appendix lists the supported Document Option Commands (DOC) for your QMS 1660 Print System. The commands are grouped by feature type.

Each command is preceded by either a DOC statement (%%) or an IncludeFeature statement (%%IncludeFeature). See the *QMS Crown Document Option Commands* manual for information on how to use each command.

This appendix also provides updated information on HP PCL 4 and PCL 5 DOC commands that has not yet been included in other QMS manuals.

Supported DOC Commands

Header/Trailer Page Commands

Print document creator%%Creator:
Print creation date and time%%CreationDate:
Print copyright statement%%CopyRight:
Print current date%%Date:
Print header page%%IncludeFeature:header
Print document host%%Host:
Print document owner%%For:
Print document title%%Title:
Print trailer page%%IncludeFeature:trailer
Print routing information%%Routing:
Print version and revision%%Version:

HP-GL Emulation Commands

Expand plot%%IncludeFeature:expand
Scale the image%%IncludeFeature:scaling
Select enhanced resolution%%IncludeFeature:enhanced

Select original paper size%%IncludeFeature:size
Select pen width and color%%IncludeFeature:pen
Select plotter%%IncludeFeature:plotter
Shift the origin%%IncludeFeature:origin
Reverse image%%IncludeFeature:reverse

HP PCL 5 Emulation Commands

Enable scalable fonts%%IncludeFeature:scalablefonts*
Establish the current resource%%IncludeFeature:install*
　and default object ID value
Remove an external object%%IncludeFeature:remove*
　　　　%%IncludeFeature:removeresource*
Reset to PCL defaults%%IncludeFeature:reset
Retain temporary macros/fonts%%IncludeFeature:retaintemporary
Select default font%%IncludeFeature:font*
Select default font ID%%IncludeFeature:fontid*
Select monochrome%%IncludeFeature:monochromegl
Select symbol set%%IncludeFeature:symbolset*
Set carriage return to CR+LF%%IncludeFeature:criscrlf*
Set linefeed to CR+LF%%IncludeFeature:lfiscrlf*
Set number of lines per inch%%IncludeFeature:linesperinch*
Set number of lines per page%%IncludeFeature:linesperpage*
Set point size%%IncludeFeature:pointsize*
Store fonts to disk%%IncludeFeature:resource*

* Indicates a DOC command about which updated information is pro-
vided in the following section, "Updated DOC Commands."

Lineprinter Emulation Commands

Number lines%%IncludeFeature:number
Retain temporary macros/fonts%%IncludeFeature:retaintemporary
Select font for current job%%IncludeFeature:font
Set carriage return to CR+LF%%IncludeFeature:criscrlf
Set formfeed to CR+LF%%IncludeFeature:ffiscrlf
Set point size for current job%%IncludeFeature:pointsize
Set linefeed to CR+LF%%IncludeFeature:lfiscrlf
Set margins%%IncludeFeature:lpmargins

Set number of lines per page%%IncludeFeature:linesperpage
Set orientation%%IncludeFeature:lporientation
Set tabs%%IncludeFeature:tabs
Specify character map type%%IncludeFeature:map
Wrap lines%%IncludeFeature:autowrap

PostScript Emulation Commands

Select PostScript level%%IncludeFeature:languagelevel

Printer Commands

Collate print jobs%%IncludeFeature:collate
Select emulation%%IncludeFeature:emulation
Select paper%%IncludeFeature:input
Select number of copies%%IncludeFeature:numcopies
Select orientation%%IncludeFeature:orientation
Select output bins%%IncludeFeature:output
Set printer resolution%%IncludeFeature:resolution

Updated DOC Commands

This section provides updated information on HP PCL 4 and PCL 5 DOC commands. This information will be merged into the appropriate manuals as they are revised. But until then, it supersedes the following:

■ *QMS Crown Document Option Commands* manual (part number 1800216-001E)—PCL 4 emulation **%%IncludeFeature: resource** command

■ *HP PCL 5 Emulation Technical Reference Manual* (part number 1800304-001A)—All PCL 5 emulation commands

PCL 5 Emulation Terminology

Font

A font is a unique set of objects that has an ID and attributes (symbol set, spacing, pitch, height, style, weight, and typeface number). A font is accessed by specifying a desired set of attributes. The system selects the font that most closely matches these attributes from the available set of fonts. See the *PCL 5 Emulation Technical Reference Manual* for information on what characterizes a PCL font.

There are two types of fonts—bound and unbound. A bound font supports a single symbol set. An unbound font supports multiple, but not all, symbol sets. With unbound fonts, the symbol sets are organized into two groups—normal and Dingbats. All downloaded fonts are bound, and all resident fonts (except Zapf-Dingbats which supports the Dingbats symbol set) support the group of normal symbol sets.

In the QMS PCL 5 emulation, only fonts located in the current resource may be accessed by a PCL font ID using the normal <ESC>(#X sequence. All other fonts (resident, cartridge, or other), including those stored on the additional resources, can be accessed only by attributes.

Also, only objects stored in the current resource may be deleted directly by the PCL language. Therefore, unless they are explicitly removed, external fonts are always available to all PCL jobs.

Font Index Number

In addition to its ID, a downloaded font also has an unique index number which is automatically assigned by the printer when the font is downloaded. This index number may change if new resources are added, but in practice it usually remains fixed. All currently available PCL fonts (resident, cartridge, temporary, permanent, and external) are listed with their font index numbers on the Advanced Status Page.

The font index number defines the *default* PCL font to be used if selectbyid is specified as the default PCL font. Do not confuse the font index with the PCL font ID, a mechanism used to identify downloaded fonts in the PCL language using the <ESC>(#X sequence. There is no way to specify fonts by their font index numbers from within the PCL language. Only the default PCL font is affected.

Object

There are three types of PCL downloaded objects:

■ **Temporary**

Temporary objects reside on the current resource and they are deleted either at the beginning and end of a job (unless Retain Temporary is set to On or On Compatibility) or when the system is reset (<ESC>E or receipt of Printer Job Language).

■ **Permanent**

Permanent objects reside on the current resource and are retained when the system is reset (<ESC>E or receipt of Printer Job Language).

■ **External**

External objects reside on the additional resources.

All objects are temporary when first created. They can be made permanent objects through PCL commands. Both temporary or permanent objects can become external objects when the current resource is changed (for temporary objects Retain Temporary must be set to On, True, or On Compatibility). External objects become permanent

when the resource in which they reside becomes the current
resource.

User-downloaded PCL objects (with the exception of palettes) are
identified by an ID when they are downloaded. The ID is usually set
by the file performing the download. If not, the system will provide a
default value (normally 0, but this can be set using the **%%Include-
Feature:install** DOC command). If two objects of the same type are
provided with the same ID, the last one received replaces the former.
From that point on, downloaded objects are accessible by their IDs.

Resource

A resource is a location where downloaded objects such as fonts,
macros, and patterns are stored. The printer has one default resource
and one additional resource for each attached hard disk. All down-
loaded objects are stored in file systems which reside on these
resources. The RAM1: resource may be used as the default, but sys-
tems with at least one hard disk use the system disk instead. So, for
any hard disk-equipped printer, all downloaded objects (except pal-
ettes, which require special handling) are stored on disk. The default
resource and one of the additional resources can reside on the same
hard disk, but they will be located in different directories of that
resource's file system.

Updated PCL 5 DOC Commands

Disable Scalable Fonts Command

Syntax	%%IncludeFeature:scalablefonts(*value*)	
Purpose	Enables/disables PCL 5 scalable fonts	
Variable	*value*	
	Purpose	Specifies whether to disable scalable fonts.
	Range	0—Enables scalable fonts 1—Disables scalable fonts
	Default	0
Notes	Disable scalable fonts to ■ Print PCL 4 documents which inadvertently select PCL 5 scalable fonts. ■ More closely emulate the PCL 4 font environment.	

Install Object Command

Syntax	%%IncludeFeature:install(*resource id object id*)	
Purpose	Establishes the current resource and the default object ID value for the current job to which it is attached. If it is attached to a job that downloads a font without setting the current object ID using the PCL escape sequence <ESC>(#X, it has the appearance of "storing" the font on disk.	
Variables	*resource id*	
	Purpose	Identifies one of the possible locations for downloaded objects
	Range	0 to 6
	Default	Internal system disk
	Format	Integer

Notes	If no **%%IncludeFeature:install** DOC command is sent, the internal default location is used; otherwise, this parameter, which must be provided, specifies one of the alternate locations. For most QMS printers, resource 6 is the system disk.

object id

Purpose	Assigns an ID to an object, such as a font, macro, or pattern
Range	0-32767
Default	0
Format	Integer
Notes	The object ID can be used instead of the usual PCL command to assign an ID. This ID is overwritten by any ID assigned from the PCL print job, if present. If neither a DOC command nor the PCL print job specify an ID, the default ID of 0 is used. Identifiers must be unique. If the ID matches an ID for an existing object, that object is deleted and replaced by the new object. If a **%%IncludeFeature:remove** command precedes a **%%IncludeFeature:install** command, the **install** command is ignored (these two commands are mutually exclusive).

Notes	All downloaded objects are by default temporary and will be deleted at the end of a job unless Retain Temporary is set to On or On Compatibility. If the file the **%%IncludeFeature:install** command is attached to does not make its downloaded fonts permanent or Retain Temporary is not set, then those objects are removed from the disk when the job completes. A downloaded font can be accessed only by its ID if the font is stored in the current resource. Regardless of its resource, a font can be selected by its attributes. Example A shows a pair of jobs that will not produce the desired results (subjob 2 has only the appearance of storing the font on disk). By contrast, examples B and C show a pair of jobs that will produce the desired results.	
Examples	**Example A—Job 1**	%! %%IncludeFeature:emulation(pcl5) install(6 20) %%EndComments <ESC>)s#W<<*download font header*>><ESC>*c33E <ESC>(s#W<<*char 33 data*>><ESC>*c34E <ESC>(s#W<<*char 34 data*>>... <ESC>*c5F
	Example A—Job 2	<ESC>(20X*this text is NOT in the downloaded font...*
	Example B—Job 1	%! %%IncludeFeature:emulation(pcl5) install(6 20) %%EndComments <ESC>)s#W<<download font header>><ESC>*c33E <ESC>(s#W<<char 33 data>><ESC>*c34E <ESC>(s#W<<char 34 data>>.. <ESC>*c5F

Example B—Job 2	**<ESC>(8U<ESC>(s1p12v0s0b4153***This text will be in the downloaded font,*** if it supports the ROMAN-8 symbol set, is proportionally spaced, 12 points in height (or scalable), upright, medium weight, and has type # 4153.
Example C—Job 1	%! %%IncludeFeature:emulation(pcl5) install(6 20) %%EndComments <ESC>)s#W<<*download font header*>><ESC>*c33E <ESC>(s#W<<*char 33 data*>><ESC>*c34E <ESC>(s#W<<*char 34 data*>>... <ESC>*c5F
Example C—Job 2	%! %%IncludeFeature:emulation(pcl5) install(6) %%EndComments <ESC>(20Xthis text is also in the downloaded font...

Remove Object Command

Syntax	**%%IncludeFeature:remove(***resource id object id object type***)**
Purpose	Removes an external object from the printer system.
Variables	***object type***

	Purpose	Specifies the kind of objects that are to be deleted from the specified printer system.
	Range	*, font, macro, pattern, or other object type
	Default	N/A
	Format	Character
	Notes	If ***object type*** is * or is not specified, then all objects on the specified resource with the specified object id are removed.

object id	
Purpose	Specifies the ID of the object that is to be removed from the printer system.
Range	*, -1 to 32767
Default	-1 (wildcard)
Format	Integer
Notes	If the *object id* is not specified, or if it is specified as * or -1, all objects on the specified resource are removed.

Notes:	Unlike the **%%IncludeFeature:install** command, the **%%IncludeFeature:remove** command does not set any defaults, and it is not directly related to the job to which it is attached. This command allows you to remove external objects from the system without having to generate a job containing both the DOC command to set the appropriate current resource and the PCL code to delete the desired object.
	If this command is specified more than once, the last command received is the one that will be executed. In the following example, the **remove(6 5 font)** command is executed, and the **remove(6 1 macro)** command is ignored:
	%%IncludeFeature:remove(6 1 macro) remove(6 5 font)

Remove Resource Command

Syntax	**%%IncludeFeature:removeresource**(*resource id object id*)
Purpose	Identifies an external object that is to be removed from the printer system.
Notes	This is an obsolete DOC command that is identical to the remove command, except that it does not allow specification of an object type. The DOC string "removeresource(aaa bbb)" is equivalent to "remove(aaa bbb *)".
Variables	*resource id*

	Purpose	Indicates the resource from which the object is to be removed.
	Range	0-6
	Default	N/A
	Format	Integer
	Notes	This ID must be specified. It indicates the resource from which the desired object is to be removed. There is no way to specify "all resources." If a **%%IncludeFeature:install** command precedes the **%%IncludeFeature:remove** command, the **remove** command is ignored (these commands are mutually exclusive). If the disk does not exist, PCL issues the `NO SPACE FOR FONT, MACRO, OR PATTERN` error message.

	object id	
	Purpose	Specifies the ID of the object that is to be removed from the printer system.
	Range	*, -1 to 32767
	Default	-1 (wildcard)

Format	Integer
Notes	If the object id is not specified, or it is specified as * or -1, all objects on the specified resource with the specified object type are removed.

Resource Command

Syntax	**%%IncludeFeature:resource***(resource id object code)*
Purpose	Establishes the current resource and the default object code value for the current job to which it is attached.
Notes	This command is identical to the **%%IncludeFeature:install** DOC command. It is included for backward compatibility. All downloaded objects are by default temporary, and will be deleted at the end of a job unless Retain Temporary is set to on, true, or on compatibility. If the file that the **%%IncludeFeature: resource** command is attached to does not make the downloaded font permanent and Retain Temporary is not set, then those objects are removed from the disk when the job completes. A downloaded font can only be accessed by its ID if the font is stored in the current resource. Regardless of its resource, a font can be selected by its attributes.
Variables	*resource id*

	Purpose	Identifies one of the possible locations for downloaded objects.
	Range	0-6
	Default	Internal system disk (usually DSK6:/BIN/EMULATE/PCL/FONTS
	Format	Integer

Notes	If no resource item is provided, the internal default location is used; otherwise, this parameter, which must be provided, specifies one of the alternate locations. For most QMS printers, resource 6 is the system disk.
object code	
Purpose	Assigns a code to an object such as a font, macro, or pattern.
Range	0-32767
Range	0
Format	Integer

Select Font Command

Syntax	**%%IncludeFeature:font (*font name*)**
Purpose	Specifies the default font to use.
Notes	Fonts are identified by the names shown above. Only the resident fonts may be selected (the available set varies from printer to printer). An asterisk "*" in the name indicates that a font is scalable, and that a point size is to be applied. The value selectbyid indicates that the default font ID or unique font index will be used for default font selection. Selecting a bound, bitmap font overrides the default settings for symbol set and point size. An unbound font uses the specified default symbol set if possible, while a scalable font uses the default font size.
Variable	*font name*
	Purpose Specifies the default font name.

Range	courier12times*blditalic courier12bolduniv* courier12italicuniv*italic courier10univ*bold courier10bolduniv*blditalic courier10italicunivcond* lineprinterunivcond*italic times*univcond*bold times*italicunivcond*blditlc times*boldselectbyindex
Default	Depends on printer configuration
Format	Character

Select Font Index Command

Syntax	**%%IncludeFeature:fontid *(index #)***
Purpose	Specifies the default font index number.
Notes	This index is used when the Default Font selected is selectbyid. This allows for selection of fonts only on the current resource. Selection of default font by index overrides the symbol set value. The symbol set is overridden if a bound font is selected as the default or if an unbound font is selected that does not support the default symbol set. If a font with the specified index exists, it is selected as the Default Font. If the specified value does not exist, courier 12 point is substituted.
Variable	*index #*
	Purpose	Specifies the index number of the default font.
	Range	0 to 32767
	Default	Selectbyid-dependent
	Format	Integer

Select Symbol Set Command

Syntax	**%%IncludeFeature:symbolset** *(name)*
Purpose	Specifies the default symbol set for the emulation.
Notes	This command specifies the default symbol set. Not all symbol sets are available with certain resident fonts. In particular, the Desktop, PS Math, Math 8, Microsoft Pub, Pi Font, PS Text, Ventura Intl, Ventura Math, Ventura US, and Windows symbol sets cannot be used with the resident bitmap fonts: courier10, courier10bold, courier10italic, courier12, courier12bold, courier12italic, and lineprinter. The five dingbat symbol sets (PS-Zapf-Dingbats, Ventura-Dingbats, Zapf-Dingbats100, Zapf-Dingbats200, and Zapf-Dingbats300) can be used with all fonts. If a mismatch between symbol set and font occurs, the standard PCL font selection mechanism is used to locate a font that matches the selected symbol set. With the standard set of fonts distributed by QMS, this matches the Times* font, but other user installed fonts could change this result.

Variable	*name*	
	Purpose	Specifies the symbol set name.

Range	roman-8iso-60
	pc-850iso-61
	pc8-usiso-69
	pc8-dniso-84
	ecma-94iso-85
	legaldesktop
	hpgerman ps-math
	hpspanishmath8
	iso-2microsoft-pub
	iso-4pi-font
	iso-6ps-text
	iso-10ventura-intl
	iso-11ventura-math
	iso-14ventura-us
	iso-15windows
	iso-16ps-zapf-dingbats
	iso-17ventura-dingbats
	iso-21zapf-dingbats100
	iso-25zapf-dingbats200
	iso-57zapf-dingbats300
Default	N/A
Format	Character

Set Carriage Return (Line Termination)

Syntax	**%%IncludeFeature:criscrlf***(value)*	
Purpose	Controls the default line termination mode (the *<ESC>&k#G* command). Specifies the line termination treatment of a carriage return.	
Variable	*value*	
	Purpose	Specifies whether a carriage return is treated simply as a carriage return, or as a carriage return-line feed combination.
	Range	Off/false—Treat line feed as a line feed. On/true—Treat line feed as a carriage return-line feed combination.
	Default	Printer configuration dependent

Format	Boolean
Notes	The result of various settings for these parameters is shown in table below, in terms of the equivalent code passed to the PCL line termination command (*<ESC>&k#G*). The second setting (lfiscrlf on, criscrlf off) is correct for most ASCII listings printed from UNIX machines. PC listings should usually be done with both items set to off, and Macintosh listings usually require the third setting (lfiscrlf off, criscrlf on). The following table shows the criscrlf/lfiscrlf commands and the corresponding PCL Line Termination command parameters.

LFISCRLF	CRISCRLF	PCL Code	Comments
Off	Off	0	CR→CR,LF→LF,FF→FF
On	Off	2	CR→CR,LF→CR-LF,FF→CR-FF
Off	On	1	CR→CR-LF,LF→LF,FF→FF
On	On	3	CR→CR-LF,LF→CR-LF,FF→CR-FF

Set Linefeed (Line Termination)

Syntax	**%%IncludeFeature:lfiscrlf** *(value)*
Purpose	Controls the default line termination mode (the *<ESC>&k#G* command); specifies the line termination treatment of a linefeed.
Variable	*value*
	Purpose — Specifies whether a linefeed is treated simply as a linefeed or as a carriage return-linefeed combination
	Range — Off/false——Treats linefeed as a linefeed. On/true——Treats linefeed as carriage return-linefeed combination
	Default — Printer configuration dependent

Format	boolean
Notes	The result of various settings for these parameters is shown in the table included in the Set Carriage Return (Line Termination) discussion, in terms of the equivalent code passed to the PCL line termination command. The second setting (lfiscrlf on, criscrlf off) is correct for most ASCII listings printed from UNIX machines. PC listings should usually be done with both items set to Off, and Macintosh listings usually require the third setting (lfiscrlf Off, criscrlf On). Note that the FF becomes a CR-FF when the LF is a CR-LF.

Set Lines Per Inch Command

Syntax	**%%IncludeFeature:linesperinch** *(#)*	
Purpose	Sets the default PCL line spacing.	
Notes	Both the **%%IncludeFeature:linesperinch** and **%%IncludeFeature:linesperpage** DOC commands affect PCL's default VMI (vertical motion index). In the event that both are specified, the **linesperpage** DOC command is ignored.	
Variable	*#*	
	Purpose	Specifies the default number of lines per inch.
	Range	1-48
	Default	6
	Format	Integer

Set Lines Per Page Command

Syntax	**%%IncludeFeature:linesperpage *(#)***	
Purpose	Sets the default PCL line spacing.	
Notes	Both the **%%IncludeFeature:linesperinch** and **%%IncludeFeature:linesperpage** DOC commands affect PCL's default VMI (vertical motion index). In the event that both are specified, the **linesperpage** DOC command is ignored.	
Variable	**#**	
	Purpose	Specifies the number of lines on the default page at the default orientation.
	Range	1-3000
	Default	Printer configuration dependent
	Format	Integer

Set Point Size Command

Syntax	**%%IncludeFeature:pointsize***(default font size)*	
Purpose	Specifies the point size for scalable default font	
Notes	If the selected font is not scalable or if a bitmap font size is specified, this setting is ignored.	
Variable	*default font size*	
	Purpose	Specifies the floating point number for point size.
	Range	0.25 to 999.75 in 0.25 increments
	Default	Printer configuration dependent
	Format	Floating point number

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D

Notices

In This Chapter . . .

- Manual notices
- Laser safety
- FCC compliance
- Energy Star compliance
- Canadian notice
- Colophon

Manual Notice

QMS, Inc. reserves the right to make changes to this manual and to the equipment described herein without notice. Considerable effort has been made to ensure that this manual is free of inaccuracies and omissions. **However, QMS, Inc. makes no warranty of any kind including, but not limited to, any implied warranties of merchantability and fitness for a particular purpose with regard to this manual**. QMS, Inc. assumes no responsibility for, or liability for, errors contained in this manual or for incidental, special, or consequential damages arising out of the furnishing of this manual, or the use of this manual in operating the equipment, or in connection with the performance of the equipment when so operated.

Laser Safety

This printer is certified as a Class 1 laser product under the U.S. Department of Health and Human Services (DHHS) Radiation Performance Standard according to the Radiation Control for Health and Safety Act of 1968. This means that the printer does not produce hazardous laser radiation.

Since radiation emitted inside the printer is completely confined within protective housings and external covers, the laser beam cannot escape from the machine during any phase of user operation.

FCC Compliance

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy, and if not installed and used in accordance with the user documentation, may

cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

1   Reorient or relocate the receiving antenna.

2   Increase the separation between the equipment and the receiver.

3   Connect the equipment to an outlet on a circuit different from that to which the receiver is connected.

4   Consult the dealer or an experienced radio/TV technician for help.

»   **Note:** *A shielded cable is required to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC rules.*

▲ **Caution**: *Any modifications or changes to this product not expressly approved in writing by the manufacturer responsible for compliance to Federal Regulations could void the user's authority to operate this product within the Laws and Regulations of the Federal Communications Commission.*

💣 **WARNING!** *To prevent electrical shock, do not remove any covers from your printer unless you are experienced in working with circuit boards and are following instructions for procedures described in QMS documentation.*

ACHTUNG! *Um elektrische Kurtzschlüsse zu vermeiden, entfernen Sie keine Gehäuseteile von Ihrem Drucker, wenn Sie keine Erfahrungen im Umgang mit elektrischen Bauteilen haben. Befolgen Sie die in der QMS Dokumentation beschriebenen Hinweise.*

Energy Star Compliance

The QMS 1660 Print System is Energy Star compliant.

» **Note:** *The EPA, as a matter of policy, does not endorse any particular company or its products.*

Canadian Users

This digital apparatus does not exceed the Class B limits for radio noise emissions from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications.

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques (de la classe B) prescrites dans le Règlement sur le brouillage radioélectrique édicté par le ministère des Communications du Canada.

Colophon

This manual was written and formatted in FrameMaker. Some illustrations were created in Adobe Illustrator and translated to WMF format in Transverter Pro; other illustrations were created directly in FrameMaker. Typefaces used are Benguiat, Courier, Helvetica, Symbol, Wingdings, and ITC Zapf Dingbats. The manual was printed in on a QMS 4525 Print System.

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E

Configuration Menu

In This Chapter . . .

- Configuration menu diagram

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- Operator Passwrd
- Use Operator Pwd
- Admin Password
- Use Admin Pwd

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- Restore Defaults
- Reboot System
- New Flash Image
- Keypad Language

» Note: We have scaled this diagram to fit it on the page. We recommend that you enlarge it on a photocopy machine for ease of use.

Glossary

AppleTalk

A local area network communication protocol developed by Apple Computer. AppleTalk operates on LocalTalk cabling and can be used by Macintosh systems, PCs, and printers. See also *LocalTalk*.

Application

Any computer program designed to help people perform a certain type of work (for example, word processing, page layout, programming, graphics, and spreadsheets). Adobe Illustrator, Excel, and Word are applications.

ASCII

An acronym for American Standard Code for Information Interchange. This coding scheme, developed by the American National Standards Institute (ANSI), specifies a digital code for each of the 96 displayable characters

on a standard computer keyboard as well as for control characters. The full ASCII character set is 250+.

Baud Rate or Baud

The data transfer rate between two devices, such as your computer and your printer. Both devices must be configured for the same baud rate. Your printer's baud rate ranges from 300 to 38,400 bits per second.

Bit

An acronym for binary digit. The bit is the most fundamental unit of information that a computer can accept. It has two states called 1 (one) and 0 (zero), or on and off, and can be used to represent a yes/no type of statement. Groups of bits are used to represent more complex statements, such as characters. The most common grouping of bits is called a byte, which consists of 8 bits. See also *ASCII*, *byte*.

Bitmap

A grid composed of small dots used to define an image, line drawing, or character. See also *raster graphics.*

Bitmapped Font

A bitmapped font is a one in which each character is represented by a set of dot patterns. Each font size requires a different set of dot patterns.

Buffer

Storage space used to compensate for a difference in rate or sequence of data flow when transmitting data from one device to another.

Byte

A unit of information consisting of 8 bits, the equivalent of one character. See also *bit*.

Cancel Key

The control panel key that cancels a print job or sends an end-of-job indicator to a print job waiting for incoming data. It is not necessary to take the printer off line before using the Cancel key.

Card

See *emulation card*, *font card*, and *security card*.

Connector

A coupler used to join a cable to a device or to another cable. Connectors are identified as male or female. A male connector has one or more exposed pins or prongs. A female connector has one or more receptacles designed to accept the pins on the male connector.

Connector Box

A piece of equipment consisting of a small box with a built-in cable that links the printer to the LocalTalk cable system.

Consumables

Supplies, such as paper, transparencies, and toner.

Control Panel

The area on the front of the printer consisting of eight keys that allow you to configure the printer and perform frequently used operations, four LEDs (light-emitting diodes) that identify various printer status information, and an LCD (liquid crystal display) message window that provides status information ad configuration menus.

Controller

The software that controls the engine of a printer. The controller is the intelligence of the printer.

Crown

A multitasking operating system architecture developed by QMS and used in the QMS 1660 Print System.

Default

A printer control panel setting used in the absence of a application selection. See also *factory default.*

Download

Transfer information from one device to another. Downloaded fonts and emulations are not built into the printer. They are transferred from the computer and temporarily stored in the printer's memory (until the printer is turned off) or on a hard disk.

dpi

An acronym for dots per inch, a measurement unit used to indicate printer resolution. Your QMS 1660 Print System has 300x300, 600x600, and 1200x600 dpi resolution.

Driver

See *printer driver*.

DTR/DSR

An acronym for Data Terminal Ready and Data Signal Received, a hardware-controlled protocol. It controls the flow of data via signals on the DTR/DSR line, as opposed to XON/XOFF protocol, which is software controlled.

Electrophotographic Drum

A drum in the toner cartridge that is sensitive to both light and electricity. It is used in the creation and transfer of images to the printed page. See also *toner*, *toner cartridge.*

Emulation

Software that allows the printer to respond to commands intended for a different type of printer. For example, when the printer is set for HP PCL emulation, it responds to the same commands (HP PCL) that a Hewlett-Packard LaserJet printer does.

Emulation Sensing Processor (ESP) Technology

Emulation Sensing Processor technology. Using a form of artificial intelligence, ESP technology analyzes incoming file data from any of your printer's interfaces, selects the appropriate printer language from those installed on the printer, and processes the print job. ESP technology works with most popular commercially available applications.

Energy Star Computers Program

A United States Environmental Protection Agency (EPA) program that promotes the use of energy-efficient personal computers, monitors, and printers and the reduction of air pollution caused by power generation.

Ethernet

A linear local area network developed by Xerox in 1976 and is presently an industry standard. Each device, or node, is connected by twisted-pair wiring, thin coaxial cable, or thick coaxial cable (not supported by your

printer). Based on the IEEE 802.3 standard, Ethernet operates at 10 megabits (10 million bits) per second.

Excess Memory Client

The memory remaining after providing all the other memory clients with their specified amounts of memory is automatically added to the excess memory client. All excess memory in your QMS 1660 Print System goes into a pool shared by the frame buffer and the display list clients.

Expansion, RAM

See *memory upgrade*.

Factory Default

The printer settings that are programmed into the printer at the factory. These settings are used unless they are changed at the printer control panel or overridden by settings in an application. See also *default*.

Flash ROM

Quick loading, reprogrammable memory that holds information (such as system code and downloadable emulations) even when the printer is turned off. The chief advantage of flash ROM is that system upgrades can be loaded from a floppy disk without the necessity of swapping out expensive EPROMS or having to place a service call.

Font

A complete character set in one typeface or style. Two types of fonts are available for your printer—downloaded and resident. See also *download*, *resident fonts*, *typeface*, and *typeface family*.

Font Card

A module the size of a credit card that contains fonts which can supplement the printer's internal, resident fonts to increase the variety of available typefaces.

Full Bleed

The capability to print an image beyond all four edges of a specified media size.

Fuser Assembly

An assembly that contains two heated rollers between which the paper passes after toner has been applied; the heated rollers bond the toner to the paper.

Gamma Correction

Gamma corrections allow you to sharpen the midrange contrast when scanning black and white images.

Gray Scale

Progressive shades from black to white which provide detail and contrast to printed images.

Handshake, Handshaking

A procedure, usually part of a communications protocol, to establish a data communications path. Devices must be able to communicate with each other. Your printer uses either XON/XOFF or DTR/DSR protocol to communicate with a computer.

Hard Disk

A secondary storage place for such items as downloaded fonts and emulations and for spooled data, thus providing virtual memory capabilities. You can add an internal IDE hard disk and up to three external SCSI hard disks to your QMS 1660 Print System.

Header Page

A separator page, printed before a print job, that identifies the print job and helps users sort out the print jobs in the printer's output tray. See the *QMS Crown Document Option Commands* manual information on customizing the header page information.

Heap

A portion of memory reserved for a program to use for temporary storage.

Host

The computer or network to which a printer is connected.

HP PCL

An acronym for Hewlett-Packard Printer Control Language, the printer control language native to the HP Laser Jet Series II and III printers. Your QMS 1660 Print System has a resident HP PCL 5 emulation.

HP-GL

An acronym for Hewlett-Packard Graphics Language, the programming language on which HP plotters are based. Your QMS 1660 Print System has a resident HP-GL emulation.

IDE

An acronym for Integrated Drive Electronics. "Integrated" refers to the fact that all of the controller electronics are on the drive itself, so no separate adapter card or expansion slot is required. See also *SCSI*.

IEEE

Institute of Electrical and Electronics engineers, an organization of engineering and electronics professionals. The IEEE 802 Standards define methods of access and control on local area networks.

Imageable Area

The maximum area of a sheet of media capable of being printed on. It is subject to both hardware limits (the physical page size and the margins required by the print engine) and software constraints (the amount of memory available for the full-page frame buffer).

Intellifonts

A collection of 37 PCL 5 fonts available on the Hewlett-Packard LaserJet 4Si. An optional Intellifont SIMM provides these fonts on your printer.

Interface

The place where two devices are physically connected, allowing them to communicate.

Interface Cable

A special cable used to connect the printer to the computer so they can communicate.

Interface Port

Your printer comes with three standard interface ports—serial, parallel, and LocalTalk—located on the back panel. Up to two network interface ports are available through the installation of optional Ethernet or Token-Ring network interface cards. See also *network interface card*.

Jam Recovery

The printer's ability to reprint the jammed page and then continue with the print job once you remove the jammed media. With most printers, if a jam occurs, you must reprint the job after removing the jammed media.

Kanji Option Kit

A pre-formatted IDE hard disk that contains Kanji fonts and other files. The Kanji fonts include Ryumin Light-KL and Gothic BBB-Medium (licensed to QMS by Morisawa and Company, Ltd.) as well as Mincho Medium, Mincho Heavy, Gothic Bold, and Gothic Heavy (licensed to QMS by TypeBank). These fonts can be printed at a variety of point sizes and in different styles and resolutions.

Landscape Orientation

See *orientation*.

LCD

An acronym for Liquid Crystal Display. The printer's LCD message window on the control panel provides status information and configuration menus.

LED

An acronym for Light-Emitting Diode. Four LEDs on the printer's control panel indicate printer status.

LocalTalk

One type of cable system used to link computers and peripheral devices in an AppleTalk network.

Manual Feed

The process by which media is fed into the printer by hand (as opposed to letter the printer automatically pull media from a cassette or tray).

Media

Any material (such as paper, labels, and transparencies) used in the printer for printed output.

Memory

The space within your printer where information is stored while being actively worked on. The term applies to internal storage space as opposed to external storage, such as disks or tapes. See also *RAM* and *ROM.*

Memory Client

A user of a block of memory. Each memory client controls certain features. When insufficient memory is allocated to a specific client, the features it controls may not be accessible.

Memory Upgrade

An available option that is easily attached to the printer's controller board to expand its standard 12 MB or 24 MB of RAM to a maximum of 64 MB in increments of 1, 2, 4, 8, 16, or 32 MB. See also *SIMM (Single In-Line Memory Module*).

Menu Key

The control panel key that accesses the printer configuration menu when the printer is off line. Use this key to advance through the menus or to return to a previous position in the menu. When changing printer setup, press this key to cancel a change (before pressing the Select key) or to return to previous menus one level at a time.

Motherboard

The main circuit board containing the primary components of a computer system.

Network Interface Card

A printed circuit board, in the shape of a card with an interface port, used to connect a printer physically to a network cable. See your QMS vendor for a complete list of available network interface cards.

Next Key

The control panel key that advances through a list of selections or options for a menu. When changing character information, use this key to advance to the next choice for the current input (underlined) character.

Non-volatile Memory

This type of memory is not lost when the printer loses power.

Null Modem Cable

A type of cable used for serial communication. This cable arranges the communication between two devices.

NV RAM

This protected form of RAM is used to store information such as your printer's configuration menu. Configuration options you have chosen, such as emulations, memory settings, and input bins, are saved to this non-volatile RAM. This informaiton is not lost when you turn off your printer.

Off Line

Not accepting data from the computer. The printer is taken off line by pressing the Online/Offline key. When the Online indicator is off, the printer is off line. The printer must be off line to enter the Configuration menu.

On Line

Accepting data from the computer. The printer is on line when the Online/Offline key is pressed and the Online indicator is on.

Online/Offline Key

The control panel key used to take the printer off line and put it back on line.

Orientation

The direction of print on the page. Printing across the narrow width of a page is called portrait orientation printing. The word "portrait" comes from portraits of people, which are usually vertical in format. Printing across the length of a page is called landscape orientation printing. The term "landscape" is derived from pictures of the landscape, which are usually horizontal in format.

Page Description Language (PDL)

A programming language, such as PostScript, that is used to describe output to a printer or a computer monitor.

Page Memory

A special buffer large enough to hold an entire page of data.

Paper Path

The path the paper follows in its journey through the printer; it begins at the paper cassette or tray pickup point and ends at the output tray.

Parallel Interface

A data transmission technique that sends each bit simultaneously over separate lines. (For this reason it is generally faster than a serial interface.) It is normally used to send 1 byte (8 bits) at a time between computers and printers. Your printer has a Centronics parallel/IEEE 1284 bidirectional parallel interface port. See also *serial interface*.

Parity, Parity Check

The addition of overhead bits to ensure that the total number of 1s in a grouping of bits is either always even (for even parity) or always odd (for odd parity). This permits detection of single errors. It may be applied to characters, transmission blocks, or any convenient bit grouping.

PCL

See *HP PCL.*

PCMCIA

An acronym for Personal Computer Memory Card International Association, which sets industry guidelines for a standard 16-bit expansion socket that accepts credit-card size memory cards (such as fonts). Type I card slots accept 3.3 mm (.13") thick cards while Type II card slots accept 5 mm (.20") cards.

Peripheral Device

A hardware device connected to a computer (such as a printer) or to a printer (such as an external hard disk).

Permanent Soft Fonts

Permanent soft fonts are soft fonts downloaded into the printer's memory that remain resident there, even if the printer is reset, until the printer is turned off or the fonts are deleted by an application. See also *download*.

Physical Memory

The amount of RAM installed in the printer.

Point Size

The height of a character or symbol in a font. There are 72 points per inch. This text is printed using a 10 point font.

Portrait Orientation

See *orientation.*

PostScript

A page description language trademarked by Adobe Systems Incorporated. PostScript Level 2 capabilities, among others, are implemented in your printer through a QMS-developed PostScript emulation. PostScript Level 2 emulation is the native language of your printer's controller. It describes text, graphics, and page images to the printer.

Previous Key

The control panel key that returns through the list of previous selections or options for the current menu. When changing the character information, use this key to return to the previous choice for the current input (underlined) character.

Print Density

Print density refers to the relative darkness of print on the page. Very dense print appears totally black. Less dense print looks lighter, with solid-filled areas not totally covered. Print density can be adjusted by a lever inside the printer.

Print Engine

The non-intelligent portion of the printer, including the laser, print drum, and paper-feeding mechanism.

Print Quality

A general measure of the appearance and readability of a printed page. Criteria of print quality include the darkness, clarity, and sharpness of the printed page.

Printed Circuit Board

A flat board made of plastic, fiberglass, or another nonconducting material on which chips and other electronic components are mounted.

Printer Driver

A printer driver is a program that translates the file you are printing into a language that the printer understands. Usually, the printer driver is installed within an application.

PROM

An acronym for Programmable Read-Only Memory. A storage device that can be programmed by electrical pulses, a PROM does not lose its memory when the printer is powered off. See also *EEPROM*, *EPROM*.

Protocol

A set of rules or standards designed to enable computers and other devices to connect to one another and to exchange information.

Queue

A list of documents waiting to be printed.

RAM

An acronym for Random Access Memory, the memory your printer uses to perform tasks. It can be written to and read from. Once a task is complete, the memory is free again to be used for another file. This memory is volatile, so if your printer loses power while a file is being sent, you must resend the file. The number and type of features you can run simultaneously on your printer depend on the amount of RAM available and how that RAM is distributed. RAM can be increased by adding SIMMs. See also *SIMM*.

RAM Disk

Also called a virtual disk. The RAM disk is an area of RAM that is used to simulate an additional hard disk. Data can be written to and read from a RAM disk more quickly than a hard disk, but a RAM disk loses any information stored on it when the printer's power is turned off. The frame buffer and spooling buffer are RAM disk clients. See also *RAM*.

Raster Graphics

The system of forming graphics using a bitmap, or grid of small dots, is called raster graphics. The term "raster" denotes the Cartesian grid system in which the dots are arranged. Bitmaps can define images, shapes, or characters created with a specific number of dots per inch. See also *bitmap*.

Rasterization

The conversion of vector graphics (images described mathematically as points connected by straight lines) to equivalent images composed of pixel patterns that can be stored and manipulated as sets of bits.

Resident

Permanently stored in the printer's memory.

Resident Fonts

Fonts permanently stored in the printer's memory; also called internal fonts.

Resolution

A measurement of the dots per inch (dpi) in output material, either printed or visual, as in a high-resolution monitor. Your printer features a 300x300, 600x600, and 1200x600 dpi resolution.

RISC

An acronym for Reduced Instruction Set Computing, a microprocessor design that focuses on rapid and efficient processing of a relatively small set of instructions.

ROM

An acronym for Read Only Memory. This type of memory contains data and/or printer-executable instructions that can be read but not modified. On QMS Crown printers, the operating system code, resident fonts, and resident emulations are all stored in ROM. This information is not lost when the printer's power is turned off.

RTS

An acronym for Request To Send. RTS is a signal sent from the host to the printer indicating it is ready to send data.

Scalable Font

A scalable font is one in which each character's dot pattern (bitmap) is generated from a mathematical representation (or outline) of the character. Scalable fonts eliminate the need to store many different font sizes.

Screen

The pattern in which dots or lines are placed on a page to create colors or levels of gray. See also *screen angle*.

Screen Angle

The angle at which a screen is printed. See also *screen*.

Screen Font

A font designed for display on a computer monitor. Screen fonts usually have corresponding printer fonts.

SCSI

An acronym for Small Computer System Interface, which allows up to three external hard disks to be connected to your printer. See also *IDE*.

Security Card

A module the size of a credit card that allows you to set passwords for the Operator Control and Administration menus. When a security card is inserted into the printer card slot, the Installation menu appears in the configuration menu.

Select Key

The control panel key used to access a menu or to choose a displayed selection or option.

Serial Interface

A data transmission technique that sends each bit sequentially over a single line. It is normally used to send one bit at a time for data communications. Your printer provides RS-422 serial communications. See also *parallel interface*.

SIMM (Single In-line Memory Module)

A small circuit board designed to accommodate surface-mount memory chips. SIMMs use less board space and are more compact than more conventional memory-mounting hardware. See also *memory upgrade*.

SIO (Simultaneous Interface Operation)

The capability of printing to all three of the printer's concurrently active ports rather than being restricted to one. See also *concurrent interfaces*.

Soft Fonts

Fonts created or stored on disks. They can be transferred to the printer's memory and remain available to be used until the printer is turned off. See also *download*.

Spool

An acronym for simultaneous print operations on line. Spooling is temporary storage to hold print jobs until the printer is available to process them.

Start-up Page

A page generated when you turn on the printer (unless you have disabled it). It gives limited information on the printer, including name, pages printed, current interface settings, and amount of RAM available.

Status Page Key

The control panel key that prints one or several pages, giving an overview of the printer status, including the current interface type, resident fonts, RAM available, and printer name.

Storage

A device in or on which information can be kept. There are three main types of storage, ROM, RAM, and hard disks. ROM stores read-only data, RAM represents temporary storage, and hard disks hold information on a more permanent basis. See also *hard disk*, *RAM*, *ROM*, *spool*.

System Administrator

The person in charge of managing a network; also called a network administrator.

Timeout

The expiration of a predefined interval, which triggers some action such as a disconnection that occurs following 30 seconds without any data activity (in a 30-second, no-activity timeout). Timeout also refers to the length or existence of such an interval.

Toner

A dry, powdered substance capable of being attracted to electrically charged areas on a photosensitive revolving drum. The printer's EP (electrophotographic) toner cartridge holds the toner. The toner is first attracted to this charged area, then attracted to the negatively charged paper. The toner is melted (or fused) in place by the fuser assembly.

Toner Cartridge

A disposable cartridge containing dry toner and a print drum. The QMS 1660 Print System uses an EP-BII toner cartridge.

Trailer Page

A separator page, printed after a print job, that identifies the print job and helps users sort out the print jobs in the printer's output tray. See the *QMS Crown Document Option Commands* manual information on customizing the trailer page information.

Transformer Box

Also known as a connector box. This piece of equipment consists of a small box with a built-in cable that links the printer to a LocalTalk cable.

Transparency

A type of media, also known as OHP (overhead projection) film, commonly used for presentations.

Typeface

The basic printed design of characters in a font. For instance, Courier, and Times typefaces each print characters of different designs.

Typeface Family

A group of related typefaces. For example, the Times typeface family consists of four typefaces: Times Roman, **Times Bold**, *Times Italic*, and ***Times Bold Italic***. See also *font and typeface*.

Utility

A program that performs a specific function of computer system management, such as maintaining disks and files or controlling a peripheral device.

Virtual Memory

An extension to the effective size of the printer's memory by using a disk file or swap file to simulate additional memory space. It enables the hard disk to accept data swapped from RAM to free temporarily the RAM for other tasks.

Volatile Memory

Memory that is cleared when the printer is turned off. Most RAM is volatile.

XON/XOFF

Control characters used for flow control in data transmission.

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